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ENVIRONMENTAL ASSESSMENT

Oil & Gas and Geothermal Leasing in the White Sands Resource Area

U. S. Department of the Interior
Bureau of Land Management
Las Cruces District Office
White Sands Resource Area
Las Cruces, New Mexico

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DEPARTMENT OF THE INTERIOR
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Amendment to Decision Record

In response to our Plan Amendment and Decision Record for the "Environmental Assessment on Oil & Gas and Geothermal Leasing in the White Sands Resource Area", NM-030-81-58, we received one protest. That protest concerned the area along the Sacramento Escarpment where we proposed "no surface occupancy" (mitigating measure #12, page 12 of Draft EA) in order to protect scenic values. The protestor suggested some minor boundary changes that would provide additional protection to the escarpment. We have accepted those charges and they are shown below:

Lands to be added to the Sacramento Escarpment "no surface occupancy" area are:

T. 17 S., R. 10 E., NMPM
Section 8: SE¼SW¼NE¼, E½NW¼SE¼

T. 18 S., R. 10 E., NMPM
Section 22: E½NE¼SW¼
Section 35: E½NE¼, NW¼NE¼, NE¼NE¼NW¼, E½SW¼NE¼, E½SE¼

T. 19 S., R. 10 E., NMPM
Section 2: E½NE¼

Additionally, we made an error in the original legal description in the Draft EA that was not corrected in the Final EA. Please make the following change (page 12, bottom of page - Draft EA):

Change T. 17 S., R. 10 E., Section 20: E½ to read.
T. 17 S., R. 10 E., Section 20: NE¼, E½SE¼

The original legal description erroneously included private land.

The entire revised legal description for the Sacramento Escarpment "no surface occupancy" area is shown below.

T. 17 S., R. 10 E., NMPM

Section 4: S½NW¼, SW¼
Section 5: E½SE¼
Section 8: E½NE¼, SE¼SW¼NE¼, E½NW¼SE¼, S½SE¼
Section 17: E½
Section 20: NE¼, E½SE¼
Section 28: All
Section 29: E½NE¼, NE¼SE¼
Section 33: N½, E½SW¼, SE¼

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T. 18 S., R. 10 E., NMPM

Section 4: E½, E½W½
Section 9: E½
Section 22: E½NE¼SW¼
Section 35: E½NE¼, NW¼NE¼, NE¼NE¼NW¼, E½SW¼NE¼, E½SE¼

T. 19 S., R. 10 E., NMPM

Section 2: E½NE¼

If you have any questions concerning these changes in the Decision Record, please contact Larry Nunez, Area Manager, White Sands Resource Area.

Daniel C. B. Rathbun
Daniel C. B. Rathbun
District Manager
Las Cruces District Office
July 28, 1982

B2459

March 3, 1849

United States Department of the Interior

BUREAU OF LAND MANAGEMENT

DISTRICT OFFICE
P. O. Box 1420
Las Cruces, New Mexico
88004

IN REPLY REFER TO
3100
3200

August 28, 1981

Dear Reader:

This Draft Environmental Assessment for Oil & Gas and Geothermal Leasing in the White Sands Resource Area, Las Cruces District, has been prepared by the Bureau of Land Management. The environmental assessment was developed to analyze the impacts of oil & gas and geothermal development in this area and to develop measures to assist in mitigating those impacts

We invite you to comment on this Draft Assessment. We would like to have your written comments submitted to this office no later than September 18, 1981. Those who comment on this draft will receive a copy of the final document.

Sincerely yours,

Larry Nunez

Larry Nunez
Area Manager
White Sands Resource Area

NM-030-81-58

DRAFT
ENVIRONMENTAL ASSESSMENT

OIL & GAS AND GEOTHERMAL LEASING
IN THE
WHITE SANDS RESOURCE AREA

Prepared by

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

LAS CRUCES DISTRICT OFFICE
WHITE SANDS RESOURCE AREA
1705 N. VALLEY DR.
LAS CRUCES, NM 88001

CONTACT: MR. TOM CUSTER

TELEPHONE - 505 523-5571
FTS - 572 - 0275

AUGUST, 1981

ERRATA SHEET

OIL & GAS AND GEOTHERMAL

DRAFT ENVIRONMENTAL ASSESSMENT

WHITE SANDS RESOURCE AREA

The numerical sequence of page numbers is incorrect from page 10 on.

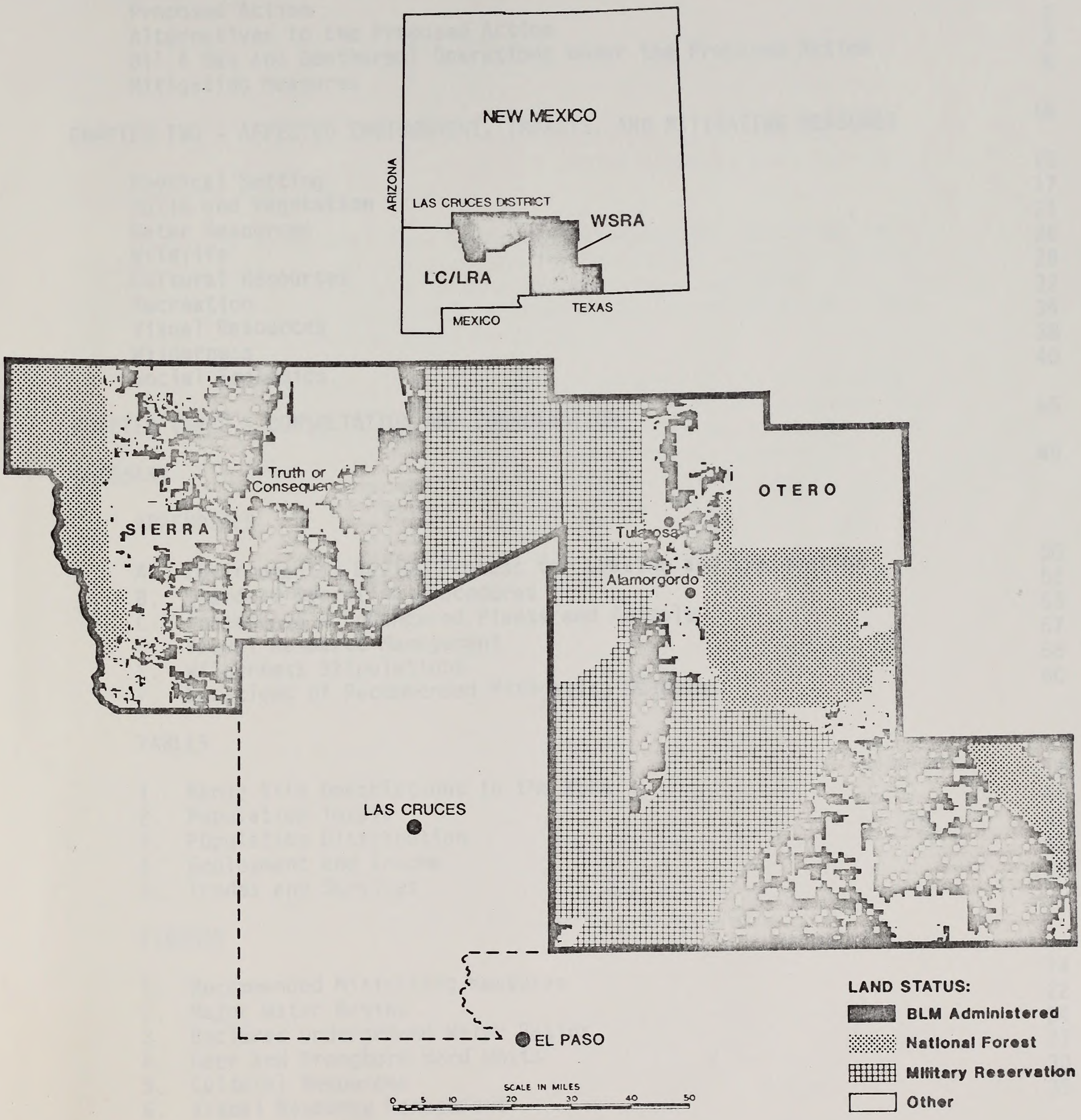
Page 11 is intentionally missing. There are two pages 34.

NOTICE

THIS DRAFT ENVIRONMENTAL ASSESSMENT SHOULD BE RETAINED TO BE USED IN CONJUNCTION WITH THE FINAL DOCUMENT. IF CHANGES RESULTING FROM PUBLIC REVIEW AND COMMENT ON THIS DRAFT ARE RELATIVELY MINOR, THE FINAL DOCUMENT WILL NOT REPRODUCE THE DRAFT TEXT IN FULL; HOWEVER, THE FINAL STATEMENT WILL INCLUDE THE MODIFICATIONS AND CORRECTIONS WHICH SHOULD BE MADE TO THIS DRAFT AS A RESULT OF PUBLIC COMMENT, AS WELL AS A RECORD OF PUBLIC COMMENTS ON THIS DRAFT AND THE RESPONSES TO THOSE COMMENTS.

WHITE SANDS RESOURCE AREA

U.S. DEPARTMENT OF THE INTERIOR, BUREAU OF LAND MANAGEMENT
LAS CRUCES DISTRICT, NEW MEXICO



Larry Nunez, White Sands Area Manager
Bureau of Land Management, 1705 N. Valley Drive P.O. Box 1420 Las Cruces, New Mexico 88004
Telephone: (505) 523-5571

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CHAPTER 1

PROPOSED ACTION AND ALTERNATIVES

INTRODUCTION

The leasing of oil & gas and geothermal resources on public lands is a major function of the Bureau of Land Management (BLM). Activities related to leasing, such as exploration, development, and production, have an effect upon the environment. The National Environmental Policy Act (NEPA) of 1969 requires that all activities affecting the land and resources under BLM jurisdiction be analyzed for potential environmental impacts.

This environmental assessment (EA) assesses the potential environmental impacts of leasing oil & gas and geothermal resources on BLM administered public lands and lands with federally-owned minerals within the White Sands Resource Area (WSRA), Las Cruces District. The WSRA consists of Sierra and Otero counties.

The prime function of this regional leasing EA is the development of mitigating measures that will protect those resource values that otherwise would not be protected under existing mitigating measures and standard operating procedures. Before approval of any surface disturbing activities, a site-specific environmental review must also be conducted, regardless of this EA. Consideration and mitigation of environmental impacts is usually a result of an on-the-ground field inspection and site-specific environmental review, whereas the regional EA serves as a "screening" process to identify known major conflicts over a large geographic area.

mention GS role in our EA's

A summary of the environmental review process is described in Appendix A. A list of sources of standard operating procedures is described in Appendix B.

BLM is also responsible for the issuance of leases on lands administered by other federal agencies, such as the U.S. Forest Service and the Bureau of Reclamation. These agencies recommend environmental protection stipulations which the BLM includes when issuing the leases. Forest Service lands within the WSRA include the Gila National Forest in northwestern Sierra County and the Lincoln National Forest in eastern Otero County. Lands administered by the Bureau of Reclamation include acquired and withdrawn lands near Elephant Butte Reservoir.

BACKGROUND

Preparation of this EA is based upon the following considerations: oil & gas exploration is expected to increase significantly in the WSRA; the existing regional EA (USDI, 1973) is in need of revision; and a regional geothermal EA that includes the entire WSRA is needed.

The total surface area in the WSRA is about 6,948,000 acres of which 33 percent or about 2,269,000 acres is BLM administered surface. The total BLM administered subsurface (mineral estate) amounts to about 37 percent or about 2,601,000 acres.

Currently, there is no oil & gas or geothermal development or production within the WSRA nor are there any Known Geologic Structures (KGS's) or Known Geothermal Resource Areas (KGRA's). Most of the oil & gas exploration in the WSRA consists of geophysical exploration. About 70 wells have been drilled within the WSRA. Most of these were drilled during the 1940's and 1950's. Presently, oil & gas drilling is uncommon, averaging less than one well drilled per year. Geophysical exploration, however, continues to increase and may lead to an increase in drilling over the next few years.

Geothermal exploration has been concentrated in the Truth or Consequences vicinity and has consisted only of geophysical exploration and the drilling of temperature gradient holes. Geothermal exploration in the WSRA peaked in 1979 and has declined since that time.

AUTHORITY

Leases are issued under the authority of the Mineral Leasing Act of February 25, 1920, as amended (44 Stat. 437; 30 USC 181 et. seq.), the Mineral Leasing Act for Acquired Land of August 7, 1947 (61 Stat. 193; 30 USC 351-359), and the Geothermal Steam Act of 1970 (84 Stat. 1566; 30 USC 1001-1025). Regulations implementing these actions are contained in Title 43, Code of Federal Regulations, Parts 3100 and 3200.

PROPOSED ACTION

The proposed action is to allow oil & gas and geothermal leasing and associated exploration, development, production, and abandonment operations within the WSRA, subject to appropriate environmental protection stipulations.

ALTERNATIVES TO THE PROPOSED ACTION

"No Action" Alternative

Under this alternative, new leases would not be issued. Because oil & gas and geothermal activity is not a significant economic factor in the WSRA, the "no action" alternative would have no impacts on the population or employment of the WSRA. The existing growth trends would continue and government expenditures and the trades and services would continue to dominate the economic base. The retirement and resort communities would also continue to grow. Mineral companies would argue that the "no action" alternative would deny them the opportunity for economic growth.

Under the "no action" alternative, oil & gas and geothermal lease fees and rental fees would be lost, as well as the potential for royalty fees if production were to occur. Presently, 50 percent of oil & gas and goethermal receipts are returned to the state and counties.

Environmental impacts would be eliminated under the "no action" alternative. In the long-term, however, potentially valuable energy resources on public lands would not be discovered.

The "no action" alternative is not consistent with BLM policy, which is to encourage the orderly development of public mineral resources where such development is compatible with multiple use management and environmental considerations. Accordingly, this alternative will not be considered.

OIL & GAS AND GEOTHERMAL OPERATIONS UNDER THE PROPOSED ACTION

Following is a summary of various oil & gas and geothermal operations which normally result in environmental impacts. The operations are divided into five phases: geophysical exploration, drilling exploration, development, production, and abandonment. Oil & gas and geothermal exploration and abandonment operations are very similar, so they will be discussed collectively. Development and production operations differ and will be discussed separately.

Geophysical Exploration (Oil & Gas and Geothermal)

Seismic prospecting is a popular geophysical exploration method. Shock waves are generated in the crust of the earth using a vibrator at the surface or by using explosives. In the vibrator method, there are usually four large trucks traveling in line, each equipped with a vibrator pad. All four vibrators are dropped to the ground simultaneously to generate the shock waves. Detectors are placed in the ground to record these waves and the signals travel to a recording truck via cables. The trucks then move a short distance forward and repeat the process. In addition to the vibrator trucks and the recording truck, other equipment commonly includes one or two cable trucks and some support pickup trucks. Travel is usually along existing roads and trails, but off-road travel is often necessary.

In the explosive method, shot-holes about 6 inches in diameter are drilled from a depth of a few feet to 200 feet. The holes are loaded with explosives and the charges are then detonated. The vehicles used for a shot hole drilling program include a truck-mounted drilling rig, water truck, recording truck, and several support pickup trucks. Existing roads and trails are used when possible, but off-road travel is sometimes necessary. The explosive shot-hole method is outdated and rarely used.

The electrical resistivity survey is a comomonly used method in geothermal exploration. This method involves burying metal plates or driving metal rods into the ground and transmitting an electrical current through these electrodes. Pickup trucks are used on existing roads and trails. Occasionally off-road travel is necessary.

Other geophysical methods include gravity surveys, magnetic surveys, airborne surveys, telluric surveys, and radiometric surveys. These types of operations result in negligible or no environmental impacts.

Drilling Exploration (Oil & Gas and Geothermal)

In geothermal exploration, federal regulations provide for the drilling of shallow temperature gradient holes without the necessity of acquiring a geothermal lease. This is in contrast to oil & gas regulations where drilling is allowed only subsequent to the issuance of a lease.

to 2000 Temperature gradient holes are generally limited to a depth of 500 feet. They are drilled utilizing portable, truck-mounted rigs and usually require only a few days to complete. They are usually drilled next to existing roads and trails. Mud pits are commonly dug but portable steel pits are also used. With proper reclamation, surface disturbance associated with the drilling of temperature gradient holes is minimal.

For all practical purposes, deep drilling operations for geothermal and for oil & gas are virtually the same. After a well site and access route are selected and approved, the access road (usually 16-20 feet wide) is constructed to accommodate a drill rig and support vehicles. Generally, the types of equipment used include track-mounted and rubber-tired dozers, scrapers, and motor graders. Moving equipment to the construction site requires the transportation of several loads (some overweight and overwidth) over public and private roads. Existing roads and trails are improved in places and occasionally culverts and cattleguards are installed if required. During construction operations, brush is cleared, the area is graded, and the access road and drill site may be improved with a surface layer of caliche. Cut and fill construction techniques may also be utilized.

Drilling sites vary in size from about 100 feet square (about 0.2 acres) for shallow wells to about 300 by 350 feet (about 2.5 acres) for deeper wells. Equipment and structures on the drilling site include the drill rig (which can reach heights of 150 feet), mud pumps, generators, mud tanks, drill pipe, storage sheds, fuel and water storage tanks, a mud logging trailer, and one or two trailers that house drilling personnel.

A reserve pit is also constructed for containing waste fluids and cuttings. It is lined with impermeable clay or plastic to prevent seepage. The pit is usually 8 to 12 feet deep and can cover as much as an acre.

Drilling operations are continuous, 24 hours a day and 7 days a week. The duration of operations ranges from a week for a 2000 foot gradient well well to several months for deep wells.

Development and Production Operations

Oil & Gas

Surface disturbance at the development and production stages is extensive. Production can continue for 20 years or more. If a commercial oil & gas reservoir is discovered, additional wells are drilled and completed, and production equipment is installed. Additional roads and facility sites are built. Well spacing is approved by the U.S. Geological Survey (USGS) and the New Mexico Oil Conservation Commission. Standard spacing for oil wells is 40 acres, and 160 acres is standard for gas wells. Surface pumps or submersible pumps lift the oil & gas to the surface where it flows through a pipeline to nearby storage tanks. The oil is stored until enough has accumulated to ship either by tank truck or via pipeline.

Special equipment separates the water and gas from the oil. Commercial quantities of gas are pumped through pipelines to intermediate shipping points. The State of New Mexico does allow, under certain conditions, the flaring or venting of noncommercial quantities of gas.

Waste water disposal can be accomplished in several ways. Fresh water can be discharged into existing drainages or it can be used for beneficial purposes such as agricultural uses. Brackish water can be pumped into evaporation pits or it can be injected into formations containing water of equal or poorer quality. Occasionally new wells are drilled for disposal purposes.

When primary oil production declines because of reduced formation pressures, secondary recovery methods may be used to recover additional oil. Injection of water is the most common recovery method used. Existing wells in the outer edges of the field are usually converted to injection wells. If needed, additional wells are drilled.

Geothermal

Once a geothermal reservoir is discovered, plans are made to develop the resource. As in the oil & gas development phase, development wells are drilled, roads are built, and various facility sites are constructed. The number of wells drilled is dependent upon several factors, including the type of geothermal resource, temperature, capacity of the wells, reservoir conditions, and topographic characteristics. Insulated aboveground pipelines are constructed to transport the steam or hot water to an electrical power generating plant. Geothermal steam and hot water can only be transported via pipeline about a mile before being significantly affected by cooling. Therefore, power plant spacing is usually one plant per square mile. Power generated by the plant is transmitted via conventional powerlines to the area of use.

or production
wells via POP

plant centerally located for wells
covering several sq mi (1 mile each side
of plant.

Geothermal reservoirs can be long-lived resources. A geothermal field in Italy has been in production since 1904. The Geysers, in California, has been in production since 1958. However, production does diminish the heat flow and additional wells must be drilled to keep the power plants at full capacity.

Disposal of waste water is a significant problem. Disposal techniques vary depending on the quality and quantity of geothermal fluids. Evaporation pits can be used. Where the waste water quality is toxic, special measures must be taken to protect surface and underground water supplies. Where the waste water quality is high, it can be discharged into existing drainages. Injection is a technique where waste water is pumped into nonproductive zones of the geothermal reservoir. A major consideration associated with this technique is the possibility of contamination of fresh water aquifers.

Injection mandatory! into zones where no g.w contam occurs.

Abandonment (Oil & Gas and Geothermal)

The depletion of oil & gas and geothermal reservoirs is generally gradual, although the decline in some geothermal reservoirs can be abrupt. Wells are plugged, capped, and then marked at the surface for future reference. As production ceases, outlying wells are abandoned and the entire field is abandoned. All equipment is removed. Roads are obliterated and rehabilitated. Surface pipelines and powerlines are removed. If fresh water was encountered, wells may be converted to conventional water wells. When completely dry, reserve pits and evaporation pits are backfilled and reshaped. All drill sites and facility sites are reshaped. Disturbed sites are usually prepared to provide a suitable seedbed for reestablishing vegetation. Water bars and terraces are constructed as needed to prevent erosion.

MITIGATING MEASURES

This section describes two categories of mitigating measures: (1) Mitigating Measures Known Before Preparation of EA, which includes those mitigating measures that were in effect prior to the preparation of the EA and those that were anticipated before the initial analysis process and (2) Mitigating Measures Developed from this Draft EA which include those mitigating measures that were recommended as a result of the assessment of impacts.

The mitigating measures will be incorporated in leases, where appropriate, as special stipulations. A list of sources of standard operating procedures is shown in Appendix B. General locations where mitigating measures will be recommended are shown in Figure 1. Larger scale maps showing where mitigating measures will be required are shown in Appendix F.

ERRATA SHEET

Oil & Gas and Geothermal
Draft Environmental Assessment
White Sands Resource Area

Please insert this errata sheet in the draft EA which you recently received.

Top of page 7: Subheading should read "Mitigating Measures Known Before Preparation of EA".

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CONSERVATION DIVISION
U.S. GEOLOGICAL SURVEY
MENLO PARK, CALIFORNIA

Mitigating Measures Developed from the Draft EA

1. No occupancy or other activity on the surface of the following described lands is allowed in order to protect the existing communications sites on Caballo Mountain (USDI, EA, 1973):

   T. 15 S., R. 4 W., NMPM
   Section 26: SW¼

2. No occupancy or other activity on the surface of the following described lands is allowed in order to protect the lands withdrawn by Public Land Order 4038 for ecological study plots and demonstration areas (USDI, 1977):

   A. Engle Ecological Plot
   T. 13 S., R. 2 W., NMPM
   Section 35: NE¼NE¼

   B. Cuchillo Ecological Plot
   T. 12 S., R. 5 W., NMPM
   Section 10: SE¼
   Sections 11 and 14: All — don't lease

   C. Nordstrom Ecological Plot
   T. 16 S., R. 5 W., NMPM
   Section 27: All
   Section 28: E½
   Section 33: N½NE¼
   Section 34: N½
   Section 35: NW¼NW¼

3. Vehicular use on the following described lands is limited to existing roads and trails in order to prevent damage to cultural resources (in accordance with the Federal Register Notice of July 31, 1980 - Rattlesnake Hill Limited ORV Designation). Exceptions may be granted following the filing of a plan of operations, provided a site-specific clearance and environmental review demonstrates that cultural resources will not be adversely affected. The lands are described as follows:

   Deleate. This true anyway - no surface disturb until get arch clearance. This only serves to locate sites for pot hunters. App F maps deleted as well

   T. 22 S., R. 8 E., NMPM
   Section 22: All except that portion northeast of Nike Blvd.
   Section 26: Lot 3: All except that portion northeast of Nike Blvd.
   Lot 4: All except that portion northeast of Nike Blvd.
   Lot 5: All
   Lot 9: Only that portion northwest of Hwy. 54
   Lot 10: All except that portion southeast of Hwy. 54
   Lot 11: All
   Section 27: All
   Section 28: All
   Section 33: All
   Section 34: All except that portion southeast of Highway 54.
   Section 35: That portion northwest of Highway 54.

4. The Wilderness Protection Stipulation is in effect in Wilderness Study Area 020-055, Jornada del Muerto and Wilderness Study Area 030-112, Brokeoff Mountains. These lands are described as follows (USDI, 1980):

A. Jornada del Muerto
T. 10 S., R. 1 E., NMPM
Section 1: All except the road leading through the lava flow.
Section 2: All
Section 3: All
Section 10: All
Section 11: All
Section 12: All except that portion southeast of the ranch road.
Section 13: Only that portion north of the ranch road.
Section 14: Only that portion north of the ranch road.
Section 15: Only that portion north of the ranch road.

T. 10 S., R. 2 E., NMPM
Section 5: Lot 4, SW¼NW¼, and that portion north of the ranch road in the NW¼SW¼
Section 6: Only that portion northwest of the ranch road except for the road leading through the lava flow.
Section 7: Only that portion northwest of the ranch road except for the ranch road leading through the lava flow.

B. Brokeoff Mountains
T. 24 S., R. 19 E., NMPM
Section 20: E½W½, E½
Section 21: All except that portion northeast of the ranch road.
Section 22: Only that portion southwest of the ranch road.
Section 27: All except that portion east of the ranch road.
Section 28: All
Section 29: E½W½, E½
Section 33: All
Section 34: All except that portion northeast of the ranch road.
Section 35: Only that portion southwest of the ranch road.

T. 25 S., R. 19 E., NMPM
Section 1: Only that portion south and west of the ranch road.
Section 3: All except the ranch road entering from the east.
Section 4: All
Section 5: All
Section 8: All
Section 9: All
Section 10: All
Section 11: All except the ranch road entering from the north.
Section 12: Only that portion north and west of the ranch roads.
Section 13: Only those portions west of the ranch road in S½N½ and S½
Section 14: NW¼NE¼, SE¼NE¼, NW¼, S½SW¼, SE¼
Section 15: N½, SW¼, W½SE¼, SE¼SE¼
Section 17: All
Section 20: All

Section 21: All
Section 22: All
Section 23: N½NE¼, SE¼NE¼, NW¼, N½SW¼, SW¼SW¼, SE¼
Section 24: All
Section 25: E½, SE¼, NW¼ (those portions east of the ranch road), NW¼NW¼ (that portion north of the ranch road)
Section 26: N½NE¼ (that portion north of the ranch road), NW¼NW¼, E½NW¼ (that portion west of the ranch road), NW¼SW¼, S½S½
Section 27: All
Section 28: All except the ranch road.
Section 29: All except that portion south of the ranch road.
Section 33: All except the ranch road.
Section 34: All
Section 35: All

T. 25 S., R. 20 E., NMPM
Section 19: Only that portion west of the ranch road.
Section 30: Lots 1-4
Section 31: Lots 1-4

T. 26 S., R. 19 E., NMPM
Section 1: All
Section 3: All
Section 4: All
Section 5: E½E½
Section 8: E½NE¼, NE¼SE¼ (that portion north of the ranch road).
Section 9: All except that portion southwest of the ranch road.
Section 10: All
Section 11: All
Section 12: All
Section 13: All
Section 14: All
Section 15: N½, SE¼
Section 23: E½
Section 24: All
Section 25: All
Section 26: E½

T. 26 S., R. 20 E., NMPM
Section 6: Lots 2-4
Section 7: Only that portion west of the ranch road.
Section 18: All except that portion northeast of the ranch road.
Section 19: All
Section 20: That portion west of the ranch road.
Section 26: SE¼SE¼
Section 28: W½SW¼, SE¼SW¼ (that portion west of the road).
Section 29: W½NE¼ (that portion southwest of the ranch road) W½, SE¼
Section 30: All
Section 31: All
Section 33: NW¼NW¼, Lot 1
Section 35: NE¼NE¼, Lot 1 (that portion east of the road), Lots 2-4

5. The area of land located within the White Sands Missile Range Extension area shall be evacuated on those days that missiles are to be fired (USDI, MOU, 1973).

6. Protection of Cultural Resources stand op ~~condit~~ stips - delete

   A qualified archaeologist acceptable to the Authorized Officer of the surface management agency must prepare the certified statement on archaeological values described in Section 18 of the Geothermal Lease Form 3200-21.

   The Authorized Officer of the surface management agency and the USGS Supervisor may require relocation of operations to protect antiquities or objects of historic value located on the leased lands, or they may require the lessee to have the site(s) excavated and salvaged by a qualified archeologist prior to proceeding with operations.

   (Note: This recommended mitigating measure will be attached to all geothermal leases. A similar stipulation is automatically included in all federal oil & gas leases issued in New Mexico.)

7. Protection of Threatened or Endangered Species stand op stips - delete

   The federal surface management agency is responsible for ensuring that the area to be disturbed is examined prior to undertaking any surface-disturbing activities on lands covered by the lease, to determine effects upon any plant or animal species listed or proposed for listing as endangered or threatened or their habitats. If the findings of this examination determine that the operation may detrimentally affect an endangered or threatened species, some restrictions to the operator's plan or even disallowances of use may result.

   The lessee/operator may, at his discretion and cost, conduct the examination on the lands to be disturbed. This examination must be done by or under the supervision of a qualified resource specialist approved by the surface management agency. An acceptable report must be provided to the surface management agency identifying the anticipated effects of the proposed action on endangered or threatened species of their habitat.

   (Note: This mitigating measure will be automatically incorporated into all geothermal leases. It is currently incorporated as a standard stipulation in all federal oil & gas leases in New Mexico.)

Mitigating Measures Developed from this Draft EA

8. No occupancy or other activity on the surface of the following described lands will be allowed in order to protect those lands withdrawn by Public Land Order 4038 for ecological study plots and demonstration areas:

A. Lee Ecological Plot
T. 23 S., R. 13 E., NMPM
Section 21: SE¼NE¼

B. Trujillo Ecological Plot
T. 12 S., R. 6 W., NMPM
Section 3: NW¼SW¼

C. Danley Ecological Plot
T. 13 S., R. 10 E., NMPM
Section 18: Lots 1-6

9. No occupancy or other activity on the surface of the following described lands will be allowed in order to protect sites listed on the State Register of Historic Places and sites nominated to the National Register of Historic Places:

Rattlesnake Hill
T. 22 S., R. 8 E., NMPM
Section 21: All

10. No drilling or storage facilities will be allowed in the following described lands in order to protect sites listed on the State Register of Historic Places and sites proposed for nomination to the National Register of Historic Places.

Alamo Mountain
T. 26 S., R. 13 E., NMPM
Section 17: S½
Section 18: E½SE¼, SW¼SE¼
Section 19: E½

11. No occupancy or other surface disturbance will be allowed in the following locations near the Tularosa River:

T. 13 S., R. 11 E., NMPM
Section 29: SW¼SE¼
Section 31: NW¼SE¼
Section 32: NE¼NW¼

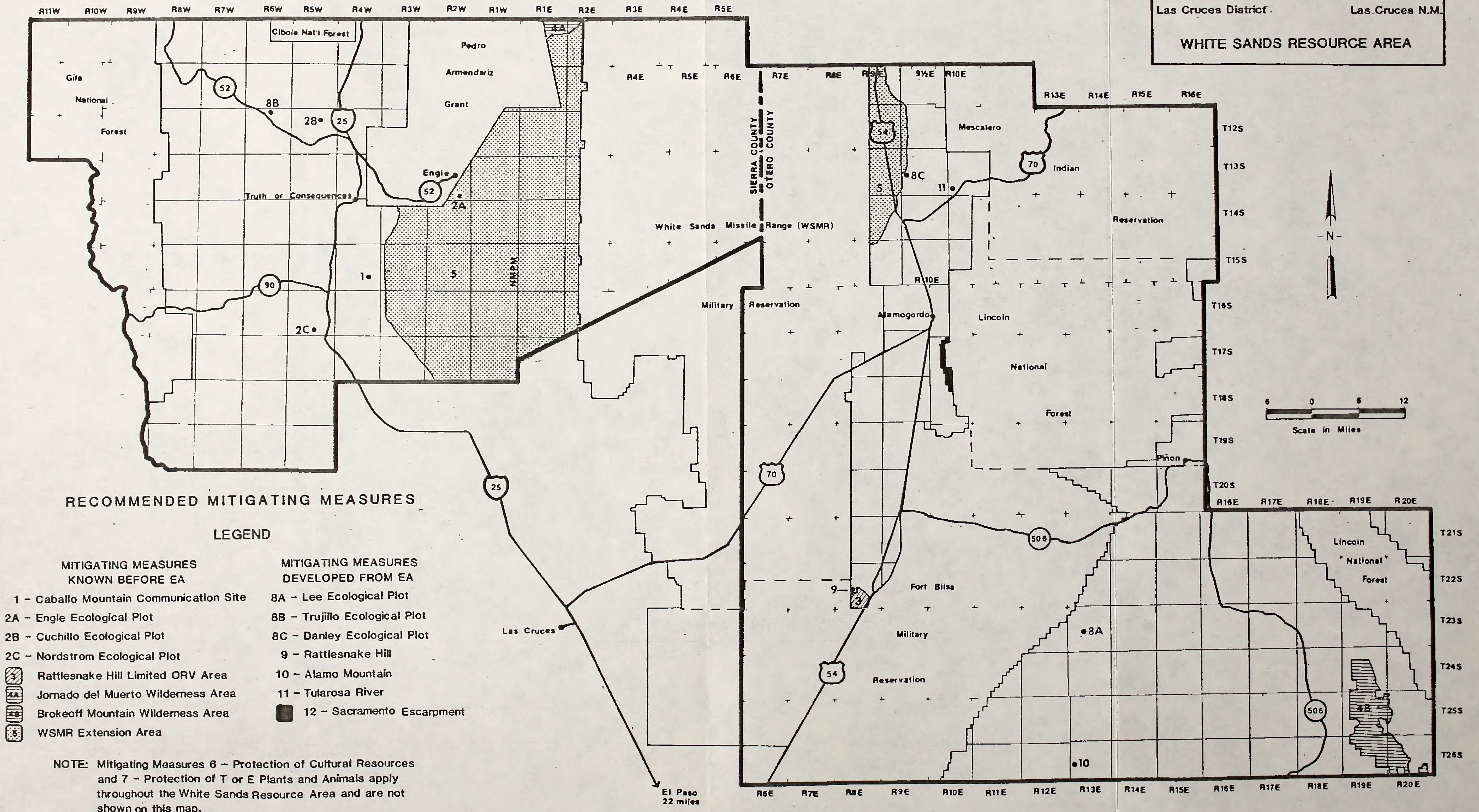
12. No occupancy or other surface disturbance will be allowed on the following described lands along the Sacramento escarpment:

T. 17 S., R. 10 E., NMPM
Section 4: S½NW¼, SW¼
Section 5: E½SE¼
Section 8: E½NE¼, NE¼SE¼, S½SE¼
Section 17: E½
Section 20: E½
Section 28: All
Section ~~28~~ 29: E½NE¼, NE¼SE¼ corrected in final
Section 33: N½, E½SW¼, SE¼

T. 18 S., R. 10 E., NMPM
Section 4: E½, E½W½
Section 9: E½

UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
Las Cruces District Las Cruces N.M.

WHITE SANDS RESOURCE AREA



RECOMMENDED MITIGATING MEASURES

LEGEND

MITIGATING MEASURES KNOWN BEFORE EA

1 – Caballo Mountain Communication Site
2A – Engle Ecological Plot
2B – Cuchillo Ecological Plot
2C – Nordstrom Ecological Plot
3 Rattlesnake Hill Limited ORV Area
4A Jornado del Muerto Wilderness Area
4B Brokeoff Mountain Wilderness Area
5 WSMR Extension Area

MITIGATING MEASURES DEVELOPED FROM EA

8A – Lee Ecological Plot
8B – Trujillo Ecological Plot
8C – Danley Ecological Plot
9 – Rattlesnake Hill
10 – Alamo Mountain
11 – Tularosa River
■ 12 – Sacramento Escarpment

NOTE: Mitigating Measures 6 – Protection of Cultural Resources and 7 – Protection of T or E Plants and Animals apply throughout the White Sands Resource Area and are not shown on this map.

SOURCE: BLM Las Cruces District Files 1981.

FIGURE 1. Recommended Mitigating Measures

CHAPTER 2

AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

Chapter 2 briefly describes the existing environment in the WSRA, the anticipated impacts that would result from the proposed action, and recommended mitigating measures. Additional and more detailed information on the existing environment is contained in the various environmental and land use planning documents in the Las Cruces District Office.

In the foreseeable future, impacts will be related primarily to oil & gas geophysical exploration, and occasionally, drilling exploration. Unlike the northwestern and southeastern portions of New Mexico, the WSRA has not yet been extensively explored and developed. Although oil & gas interest is at a moderate to high level in the WSRA, exploration is still in the geophysical stage and drilling is rare. Significant environmental impacts would not be expected to occur until there is intensive drilling or actual development.

PHYSICAL SETTING

Climate

The climate of the WSRA would not be affected by oil & gas and geothermal operations. However, climatic conditions influence other resources such as air quality, soils, and vegetation and would, therefore, influence the degree of impacts resulting from exploration, development, and production operations.

The climate of the WSRA is arid to semi-arid. Annual precipitation averages 7 to 9 inches at the lower elevations, which is characteristic of most of the area. Over half the yearly precipitation is received during late summer when moisture laden air from the Gulf of Mexico enters the area.

The average annual temperature is about 60°F. Daily maximum temperatures commonly exceed 100°F in June and July, but average about 90°F in the summer. Daily minimum temperatures average about 25°F in January.

During the summer, the prevailing wind direction is from the southeast. Brief, strong winds often accompany thunderstorms during the summer. During the winter, the prevailing wind direction is from the northwest.

The windy season is during the spring, when dry, gusty winds from the west often exceed 30 miles per hour, occasionally causing severe dust storms.

Air Quality

Generally, the air quality of the entire WSRA is very good. However, carbon monoxide from automobiles, blowing dust, and sulfur dioxide from smelters and other industries burning fossil fuels contribute to degradation of air quality, especially in the Rio Grande Valley and Tularosa Basin.

Need + mit
Impact - will
geo, oil/gas ops
signif increase
air problems?

The lower Rio Grande Valley occasionally has poor air quality. Industrial pollutants and automobile exhaust from the densely populated El Paso - Ciudad Juarez vicinity contribute heavily to air pollution. This is especially evident during the winter when temperature inversions prevent the escape and dispersion of polluted air to higher altitudes. This polluted air often drifts northward to the WSRA via the Rio Grande Valley and Tularosa Basin.

Blowing dust also contributes to air pollution throughout most of the WSRA especially during the windy spring months. Sparsely vegetated soils and numerous unpaved roads are the principal sources of these particulates.

TOPOGRAPHY

The WSRA is within the Basin and Range physiographic province. Typical topographic features include rugged and steep fault block mountain ranges, broad basins, and more gentle volcanic landforms.

From northwest to southeast across the WSRA, major features are the Cuchillo Mountains, Palomas and Engle Basins, Rio Grande Valley, Caballo Mountains, Jornada del Muerto, San Andres Mountains, Tularosa Basin, Sacramento Mountains, and the Guadalupe Mountains.

Elevations in the area range from a low of about 3,650 feet in the southeastern portion of Otero County to a high of about 8,900 feet in the northern San Andres Mountains. More typical elevations range between 4,000 and 5,000 feet.

GEOLOGIC HAZARDS

Need mit section

The Rio Grande rift has the greatest potential for significant seismic activity of any area in the state due to its young geologic age. Pediment surfaces offset by fault scarps, historical reports of earthquakes, and recent seismic studies indicate that tectonic activity within the rift continues at the present time.

Historical records, instrumental data, and analysis of microearthquakes in New Mexico indicate that the most seismically active segment of the Rio Grande rift is in the Socorro vicinity. Other areas of seismic risk include the Albuquerque-Belen area and the El Paso, Texas-Las Cruces area. However, that portion of the rift occurring in Sierra County is expected to have a low seismic risk (Sanford, 1972).

Mass wasting in the form of debris slides is relatively common in the WSRA especially where thin-bedded shales and limestones crop out on steep slopes.

Some of the clayey soils in the WSRA pose a threat to various construction projects because of differential subsidence and heaving.

SOILS AND VEGETATION

Affected Environment

Soil and vegetation data have been collected and compiled for that portion of the WSRA within Sierra County, but similar data is not available for Otero County. The data is grouped by range site, which is defined as a distinctive kind of rangeland which has the potential to support a native plant community characterized by an association of plant species different from that of other sites.

The soil type and climatic conditions determine potential plant communities. Soil surveys depict areas which are composed of one or more soil associations. Several soil associations with similar features, characteristics, and potential for producing distinctive plant communities are grouped into range sites.

There are 22 different range sites within Sierra County, categorized in two Major Land Resource Areas (MLRA): (1) the Southern Desert - Subresource Area SD-2 (MLRA-42), and (2) the Western Plateau - Subresource Area WP-3 (MLRA-36), as described by the Soil Conservation Service (1980). The major portion of Otero County lies within these two MLRA's, and the descriptions shown for Sierra County would approximate conditions in Otero County.

Table 1 lists the range sites in each MLRA, their approximate percentage of the total area, major vegetation types, and susceptibility to wind and water erosion.

TABLE 1

RANGE SITE DESCRIPTIONS IN THE WSRA

Range Site	% of Total Area	Major Vegetation Types	Susceptibility to Erosion Wind	Susceptibility to Erosion Water
Southern Desert MLRA 42 - SD-2				
Gravelly	27%	Creosotebush, Midgrass, Mixed desert shrub	Moderate	Moderate
Deep Sand	2%	Mesquite, Creosotebush, Mixed desert shrub	High	Low
Sandy	26%	Mesquite, Creosotebush, Snakeweed	High	Low

TABLE 1 (continued)

Range Site	% of Total Area	Major Vegetation Types	Susceptibility to Erosion	
			Wind	Water
Loamy	3%	Creosotebush, Tarbush, Midgrass	Moderate	Moderate
Shallow Sandy	8%	Creosotebush, Snakeweed, Mesquite	High	Low
Draw	2%	Midgrass, Creosotebush, Tarbush	Low	Moderate
Bottomland	2%	Midgrass, Creosotebush, Mixed desert shrub	Moderate	Moderate
Limestone Hills	3%	Mixed desert shrub, Midgrass, Creosotebush	Low	Moderate
Clayey	1%	Midgrass	Moderate	Low
Gravelly sand	4%	Creosotebush, Mixed desert shrub, Mesquite	High	High
Igneous hills	7%	Midgrass, Creosotebush, Mixed desert shrub	Low	Moderate
Gravelly loam	3%	Creosote, Snakeweed, Tarbush	Moderate	Moderate
Salt flats	1%	Midgrass, Mesquite	Moderate	Low
Malpais	6%	Creosotebush, Midgrass, Snakeweed	Low	Low
Western Plateau MLRA-36 - WP-3				
Gravelly	1%	Midgrass, Juniper, Creosotebush	Low	Moderate
Hills	2%	Midgrass, Pinyon-Juniper, Pinyon	Low	Moderate
Loamy	Trace	Midgrass	Moderate	Moderate
Breaks	1%	Midgrass, Juniper	Moderate	Moderate
Bottomland	Trace	Midgrass	Moderate	Moderate
Clayey	Trace	Midgrass	Moderate	Moderate
Basalt Hills	1%	Midgrass, Juniper, Pinyon-Juniper	Low	Moderate
Sandy	Trace	Mixed desert shrub	High	Low

The plant composition on a particular range site varies depending upon the ecological condition. Ecological condition is the current plant composition relative to what the site is naturally capable of producing, categorized as excellent, good, fair, or poor. For example, a sandy range site in excellent ecological condition is dominated by black grama, dropseeds, bush muhly, and a variety of forbs. As the site deteriorates, plant composition changes, and in poor ecological condition a sandy range site would normally be dominated by mesquite and snakeweed, with few grasses and forbs. The possibility of several distinctive plant communities occurring on any one range site, depending upon ecological condition, prevents a description of the typical plant community found on the range sites within the WSRA.

The lands described below are protective withdrawals which were withdrawn by Public Land Order 4038, June 6, 1966, for the purpose of ecological study plots and demonstration areas. These plots provide information concerning rangeland condition and trend in the absence of grazing. All three are open to mineral leasing.

Lee Ecological Plot
T. 23 S., R. 13 E., NMPM
Section 21: SE¼NE¼

Trujillo Ecological Plot
T. 12 S., R. 6 W., NMPM
Section 3: NW¼SW¼

Danley Ecological Plot
T. 13 S., R. 10 E., NMPM
Section 18: Lots 1-6

Impacts

The impacts on the soil and vegetation complex associated with oil & gas and geothermal activities would vary depending primarily upon the range site and topography.

Geophysical exploration off of existing roads would produce minor impacts on all range sites provided the routes are not bladed. Existing vegetation would be trampled and broken, and soils would be compacted slightly. The finer textured soils, typical of bottomland, draw, clayey, and salt flat range sites, compact more than those of the other range sites. Long-term impacts associated with exploration would be insignificant, provided routes are abandoned.

The removal of vegetation and accompanying soil disturbance associated with construction of drill sites, access roads, and facilities would impact existing and potential productivity of all range sites. Removal of vegetative cover would increase the potential for accelerated wind and/or water erosion on all sites. The deep sand, sandy, shallow sand, and gravelly sand sites are most suspectible to wind erosion once vegetation is removed. The gravelly, limestone hills, gravelly sand, igneous hills, and hills range sites are most suspectible to water erosion. Upon removal of vegetation, infiltration is reduced and run-off is increased, which produces accelerated water erosion, especially where slope increases. The removal of top soil on the limestone hills, igneous hills, hills, breaks, and basalt hills range sites would permanently reduce productivity on these sites.

Assuming an average stocking rate of 6 animal units per section, for every 9 acres of existing vegetation permanently lost to drilling sites, access roads, and associated facilities, 1 animal unit month of forage would be unavailable for use by livestock and wildlife.

If surface occupancy is permitted in the withdrawn ecological plots identified previously, their value for data and study relating to rangeland condition and trend would be permanently destroyed.

This para is mitigation

Standard operating procedures and mitigating measures developed during the site-specific environmental review would be sufficient for the reclamation of most disturbed areas. Special stipulations would be developed to prevent accelerated soil loss on those areas most susceptible to wind and/or water erosion.

mit needed for
long term develop
as pad, plant sites

Mitigating Measures

Geophysical exploration will be limited to existing roads and trails where possible. Blading of off-road routes will not be permitted, unless blading is necessary for vehicles to travel across rough or steep routes.

A "no surface occupancy" stipulation will be attached to leases on lands within the ecological plots on the Trujillo, Lee, and Danley allotments.

Adverse Impacts Which Cannot be Avoided

Adverse impacts associated with off-road geophysical exploration would be trampling and breaking of vegetation and minor soil compaction. In areas requiring blading, vegetative cover would be destroyed resulting in reduced infiltration, increased run-off, and increased soil erosion. The severity of these unavoidable impacts depends upon the range site and topography of the bladed area.

Adverse impacts associated with development and production activities would be the loss of an average one animal unit month of forage for every nine acres devoted to drilling sites, access roads, and other facilities.

Relationship Between Short-Term Uses and Long-Term Productivity of the Environment

The impacts of geophysical exploration would not affect the long-term productivity of most range sites. Most sites would recover satisfactorily within two years after vehicles travel across them. Bladed areas along exploration routes would normally revegetate naturally as long as precautions are taken to prevent accelerated soil erosion. The recovery period would vary, depending upon the productivity of the disturbed site, but normally would take from three to ten years.

Upon development of an oil & gas or geothermal field, areas devoted to access roads, drilling sites, pumping stations, and storage facilities would be removed from contributing to the forage resource for the life of the field.

WATER RESOURCES

Affected Environment

Surface Water

Most of the WSRA is within the Rio Grande Basin, one of six major surface water drainage divisions in New Mexico. Within the Rio Grande Basin are several topographically closed basins that occur in the WSRA: the Mimbres Basin, Jornada del Muerto, Tularosa Basin, and Salt Basin. These basins are shown in Figure 2.

Surface water is a rare and precious commodity in the region. Perennial streamflow does exist but is limited to the Rio Grande and those streams that drain the mountainous areas along the eastern boundary of the Tularosa Basin. These streams include Three Rivers Creek, Tularosa River, La Luz Creek, Sacramento River, and Pinon Creek. Drainage from these streams terminates in the Tularosa and Salt Basins.

Tributaries to the Rio Grande are ephemeral, flowing only in times of storm events. At higher elevations in the mountainous areas west of the Rio Grande, short stretches of streamflow occur, but the water seeps back into the ground long before reaching the Rio Grande. These streams include Animas Creek, Palomas Creek and Percha Creek.

As is typical of topographically closed basins, the Mimbres Basin, Jornada del Muerto, Tularosa Basin, and Salt Basin contain playas that form ephemeral lakes during rainy periods and alkali flats upon drying. Because closed basins have no outside drainage, water quality problems are naturally contained. The Rio Grande, however, is free flowing and provides water for use in New Mexico and Texas, plus an average annual release of 60,000 acre-feet allocated to Mexico.

Water use is different in the closed basins than in the Rio Grande Basin. Water is used to a large extent by livestock and wildlife in the closed basins whereas irrigation is the primary use of water from the Rio Grande. Elephant Butte and Caballo Dams on the Rio Grande provide large surface water storage reservoirs for irrigation, electric power generation, flood control, and recreational purposes. Storage capacities of Elephant Butte and Caballo reservoirs are 2,222,620 and 344,000 acre-feet, respectively. The dams are under the jurisdiction of the Bureau of Reclamation, whereas allocation of waters stored in Elephant Butte and Caballo reservoirs is governed by the Rio Grande Compact, a 1906 treaty with the Republic of Mexico, and contracts with the Elephant Butte Irrigation District, New Mexico, and the El Paso County Water Improvement District No. 1, Texas.

The 100 year floodplain for perennial and major intermittent streams represents a significant resource in the WSRA. Natural and beneficial floodplain functions include channel maintenance, groundwater recharge, flood control and special ecosystem maintenance. Flood hazard maps are published by the Federal Insurance Administration which show the 100 year flood prone areas within the WSRA.

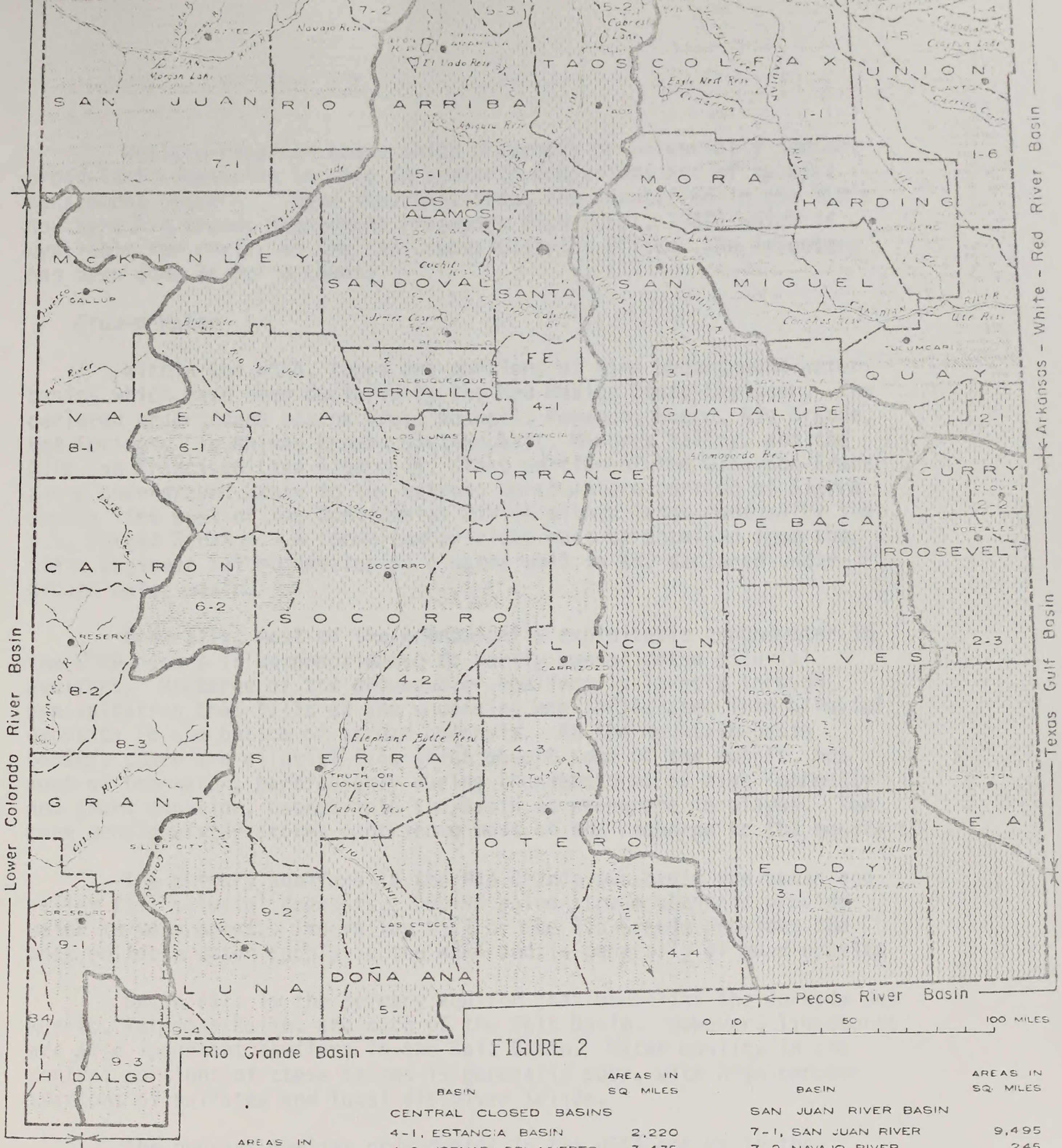


FIGURE 2

BASIN	AREAS IN SQ MILES
ARKANSAS RIVER BASIN	
1-1, CANADIAN RIVER	13,056
1-2, PURGATOIRE RIVER	90
1-3, DRY CIMARRON RIVER	710
1-4, CARRIZOZO CREEK	220
1-5, NORTH CANADIAN RIVER	1,040
1-6, CARRIZO CREEK	1,950
TOTAL	17,066
SOUTHERN HIGH PLAINS	
2-1, RED RIVER	656
2-2, BRAZOS RIVER	721
2-3, LEA PLATEAU	4,766
TOTAL	6,143
PECOS RIVER BASIN	
3-1, PECOS RIVER	25,922

BASIN	AREAS IN SQ MILES
CENTRAL CLOSED BASINS	
4-1, ESTANCIA BASIN	2,220
4-2, JORNADA DEL MUERTO	3,475
4-3, TULAROSA BASIN	6,540
4-4, SALT BASIN	2,370
TOTAL	14,605
RIO GRANDE BASIN	
5-1, RIO GRANDE	25,390
5-2, COSTILLA CREEK	230
5-3, RIO SAN ANTONIO	260
TOTAL	25,880
WESTERN CLOSED BASINS	
6-1, NORTH PLAINS	1,000
6-2, SAN AGUSTIN PLAINS	1,965
TOTAL	2,965

BASIN	AREAS IN SQ. MILES
SAN JUAN RIVER BASIN	
7-1, SAN JUAN RIVER	9,495
7-2, NAVAJO RIVER	245
TOTAL	9,740
LOWER COLORADO RIVER BASIN	
8-1, LITTLE COLORADO RIVER	5,310
8-2, SAN FRANCISCO RIVER	1,905
8-3, GILA RIVER	3,490
8-4, SAN SIMON CREEK	220
TOTAL	10,925
SOUTHWESTERN CLOSED BASINS	
9-1, ANIMAS BASIN	2,430
9-2, MIMBRES BASIN	4,410
9-3, PLAYAS BASIN	1,410
9-4, WAMEL BASIN	170
TOTAL	8,420
STATE TOTAL	121,666

Wetland-riparian areas which presently or potentially support broad-leaf vegetation in arid in semiarid ecosystems are of special management concern. These important areas are identified in the BLM's Southern Rio Grande Management Framework Plan (USDI, 1980) which is available for review at the Las Cruces District Office. No inventory has been done in Otero County.

Ground Water

Within the WSRA, there are portions of nine underground water basins which have been declared by the New Mexico State Engineer. The declared underground basins are: Roswell, Penasco, Hueco, Rio Grande, Hot Springs, Las Animas Creek, Nutt-Hockett, Mimbres Valley, and the Gila-San Francisco (see Figure 3). That portion of the Gila-San Francisco underground basin in the extreme northwestern portion of Sierra County lies west of the Continental Divide within lands managed by the U.S. Forest Service. A formal water right must be obtained from the State Engineer before developing a water well in any declared underground water basin.

Generally, most of the economically exploitable groundwater in the WSRA occurs in unconsolidated to partly consolidated alluvial aquifers. Recharge of the groundwater aquifers is largely through precipitation that falls on the mountains and infiltrates into alluvial deposits in the bottom of stream channels. At the mountain-basin border, there are alluvial fans which absorb some of the runoff, but much of the water, particularly during thunderstorms of high intensity and short duration, passes into the basin to evaporate in playas. The more gentle winter storms contribute most of the recharge to the aquifers.

The primary aquifers in the Rio Grande sub-basin are basin and valley fill alluvial deposits. Buried paleo-stream channels provide water in many areas. The valley fill of the Rio Grande provides the most reliable water supply in the WSRA and is generally of good quality.

Basin fill is the primary aquifer that underlies the Jornada del Muerto, Tularosa Basin, and much of the Salt Basin. However, limestones are also important aquifers in the Salt Basin. Water quality in the central portions of these basins is generally poor, with high concentrations of sulfates and total dissolved solids.

The poorest quality groundwater in the WSRA occurs in the Tularosa Basin which contains vast quantities of saline water. The only area of fresh water in the Tularosa Basin lies south of Alamogordo along the mountain front.

Impacts

Actions which result in the removal of vegetation and the disturbance of soil (i.e., the building of access roads, construction of various facility sites, and drilling of wells) would cause surface disturbance that could result in the siltation of surface waters. In areas

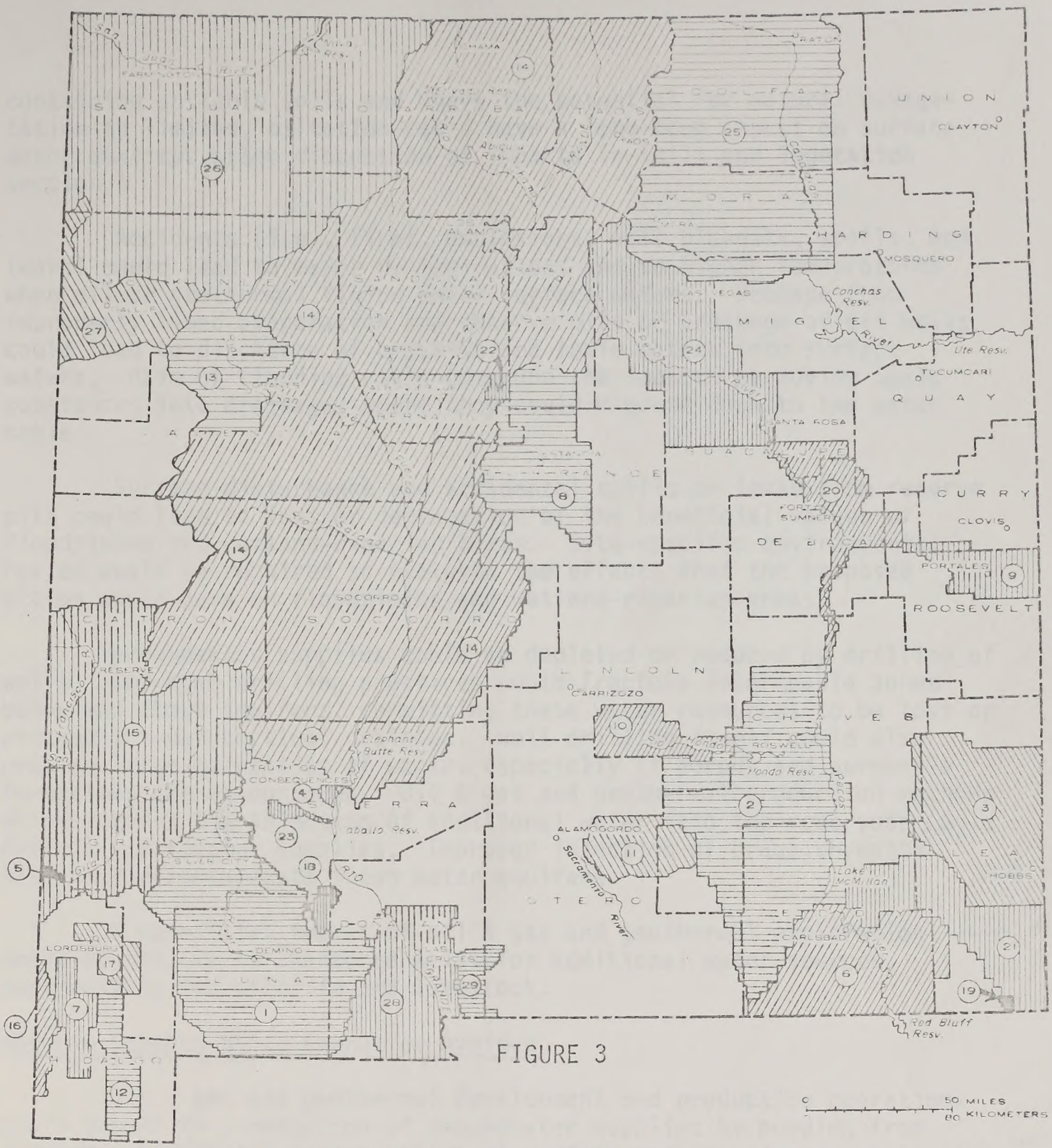


FIGURE 3

DECLARED UNDERGROUND WATER-BASINS IN NEW MEXICO

BASIN	AREA IN SQUARE MI.	BASIN	AREA IN SQUARE MI.
1. MIMBRES VALLEY	4,279	16. SAN SIMON	263
2. ROSWELL	4,281	17. LORDSBURG VALLEY	329
3. LEA COUNTY	2,180	18. NUTT - HOCKETT	133
4. HOT SPRINGS	38	19. JAL	15
5. VIRDEN VALLEY	19	20. FORT SUMNER	1,059
6. CARLSBAD	1,965	21. CAPITAN	1,550
7. ANIMAS	426	22. SANDIA	73
8. ESTANCIA	1,724	23. LAS ANIMAS CREEK	75
9. PORTALES	628	24. UPPER PECOS	2,708
10. HONDO	611	25. CANADIAN RIVER	5,825
11. PEÑASCO	723	26. SAN JUAN	9,727
12. PLAYAS VALLEY	515	27. GALLUP	1,439
13. BLUEWATER	1,318	28. LOWER RIO GRANDE	1,585
14. RIO GRANDE	26,209	29. HUECO	255
15. GILA - SAN FRANCISCO	5,659	TOTAL	75,611

containing unstable soils and where the potential for natural revegetation is limited, siltation could have a long-term impact on surface water quality. (See discussion of impacts in Soils and Vegetation section.)

Accidents (i.e., fires, explosions, well blowouts, spills, and leaks) could lead to major contaminations and to higher temperatures when oil or geothermal fluids enter surface waters. Seepage from improperly lined evaporation and reserve pits or breakage of pit wells could lead to discharge of brackish and toxic waters into surface waters. Rain or flooding could compound the impacts by moving toxic substances into drainages where they could migrate down to the water table.

Surface disturbance and accidental spills or leaks from reserve pits could lead to loss or degradation of the beneficial values of floodplains and wetland-riparian areas. Site-specific environmental review would be required to evaluate the effects that the proposed action would have on floodplains and wetland-riparian areas.

Groundwater supplies could be depleted or reduced by drilling of wells. Improper drilling practices could fracture impermeable zones below and above aquifers, permitting these water resources to be lost or reduced through vertical drainage. Well drilling itself could also require large quantities of water, especially if porous and permeable formations are encountered. Oil & gas and geothermal production methods which require the injection of additional water into the reservoir could deplete groundwater supplies. Improper injection of brackish waste water could contaminate fresh water aquifers.

Need mit section

these are mitable

A beneficial impact of oil & gas and geothermal exploration would be the use of abandoned wells for additional water sources, particularly for wildlife and livestock.

Adverse Impacts Which Cannot be Avoided

Oil & gas and geothermal development and production operations would result in a reduction of groundwater supplies by pumping from storage. Accidental contamination of surface and groundwater would also reduce water supplies. This could seriously impact economic development in the WSRA.

production not
from aquifers, but
deep res - not comm
w/ groundwater

Relationship Between Short-Term Uses and Long-Term Productivity of the Environment

As growth continues in the WSRA, the demand for water will continue to increase. The development and production operations in an oil & gas or geothermal field would reduce the availability of suitable water for wildlife, livestock, and humans. New water supplies could be discovered through test drilling, but in the long-term, water supplies could be significantly reduced.

how being reduced?
where are they being used?

WILDLIFE

Affected Environment

Several vegetation types which exist throughout the WSRA provide habitat for a variety of wildlife species. The draft Grazing Environmental Impact Statement prepared for the Southern Rio Grande Planning Area includes most of Sierra County and discusses occurrences of game and nongame species and their preferred habitats. Information of this detail is not available for Otero County although some information is available in the following BLM planning documents: Unit Resource Analysis, Alamogordo Planning Unit (Las Cruces District Office 1976); Unit Resource Analysis, Mesa Planning Unit (Las Cruces District Office 1974). Additional information is available in Intensive Inventory Analysis on Pronghorn Antelope, Antilocapra Americana (BLM, 1971).

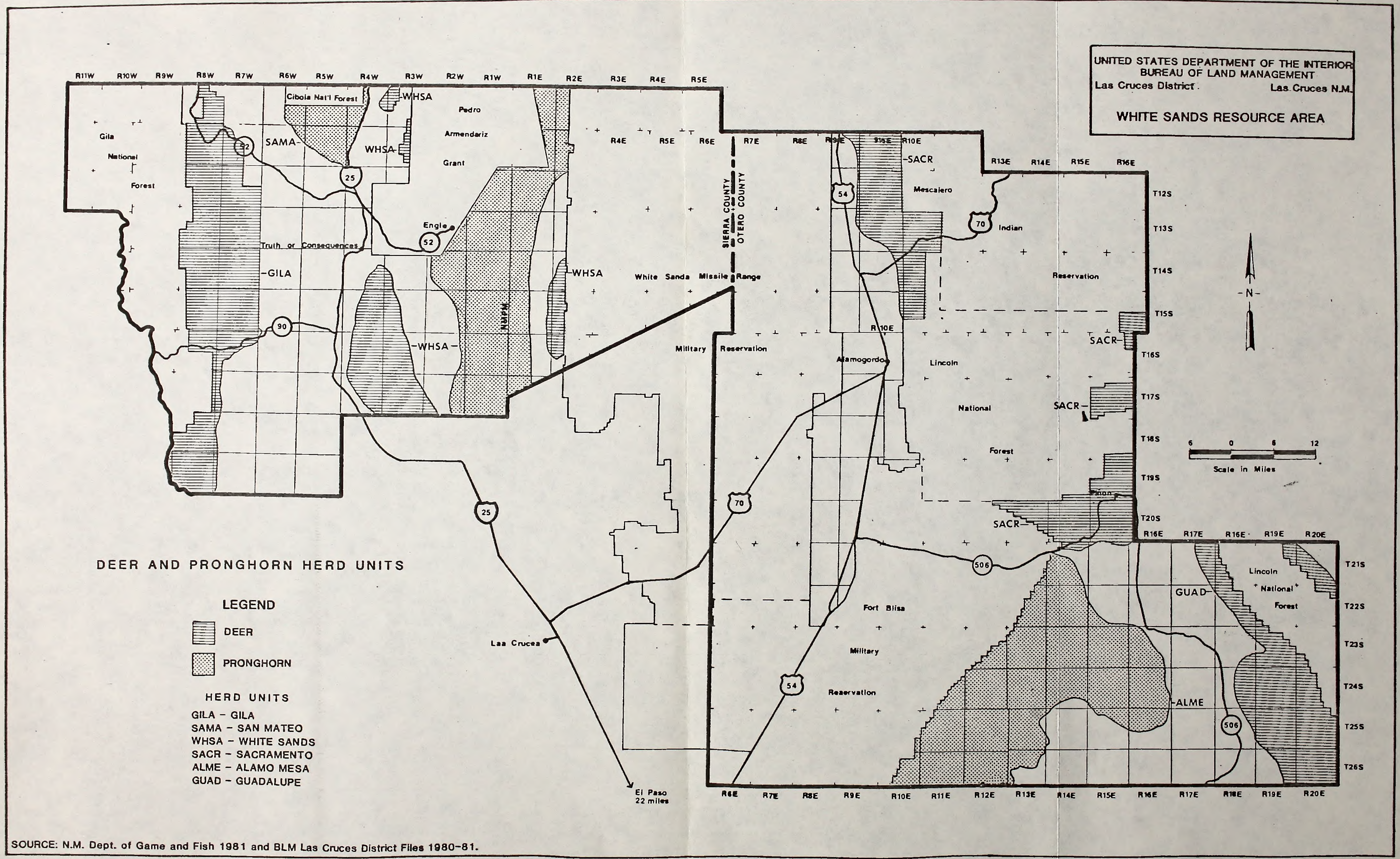
Herd units designated by the New Mexico Department of Game and Fish contain those areas occupied by significant populations of deer and pronghorn (Figure 4). The proper combination of biological requirements (e.g., pronghorn - Otero Mesa), small isolated habitat (e.g., mule deer - Caballo Mountain), or winter range for migratory deer (Cuchillo and San Andres Mountains) account for localized abundance within some herd units.

The riparian habitat associated with the Rio Grande, Elephant Butte and Caballo Reservoirs, the south fork of Palomas Creek, Berrenda Creek, Tularosa River, and Percha Creek provides a crucial source of biological diversity. The majority of federal and state listed threatened or endangered species which may occur in the WSRA are either dependent on these areas or utilize them proportionally more than any other habitat types. Other state endangered animals and the habitats which they occupy are listed in Appendix C.

Impacts

Impacts of oil & gas and geothermal activities on wildlife populations vary. If a wildlife population is distributed over a large portion of the resource area, impacts are unlikely to be significant in a regional sense. On the other hand, wildlife species which are restricted to specialized or uncommon habitats could be significantly affected by human disturbance in that habitat. Individually, various activity phases may not cause a large amount of disturbance and resident and migratory wildlife could probably adapt. Cumulatively however, the various stages of an activity may have a significant impact on wildlife habitat. Some species are opportunistic in their requirements and can deal with change to their environment or can easily adapt to new environments. Others are more specialized, their needs are more specific, and adaptation to a new environment is not easily accomplished.

Vehicular travel, drilling operations, and other associated activities could cause displacement or harrassment. Construction of roads, drill pads, pumping stations and various facility sites removes



DEER AND PRONGHORN HERD UNITS

LEGEND

▤ DEER

▨ PRONGHORN

HERD UNITS

GILA - GILA
SAMA - SAN MATEO
WHSA - WHITE SANDS
SACR - SACRAMENTO
ALME - ALAMO MESA
GUAD - GUADALUPE

SOURCE: N.M. Dept. of Game and Fish 1981 and BLM Las Cruces District Files 1980-81.

FIGURE 4. Deer and Pronghorn Herd Units

vegetation. This vegetation provides cover and food for wildlife. This alteration of habitat not only affects the quality of the disturbed area but that of adjacent, undisturbed land. Animal species and their habitat would be greatly affected as a result of indiscriminate shooting, poaching, increased off-road vehicle activity, and other actions. The impacts associated with increased human populations would extend beyond the area of operations. Other areas exhibiting important and unique biota may also be affected. Intensive seismic exploration and drilling activity in areas occupied by pronghorn could cause serious impacts on pronghorn if the disturbance occurs during fawning (May-June). If such activities occur during the nesting season, nests could be abandoned or destroyed and the young could be lost (a particular concern with raptors).

Throughout the WSRA, water is a highly limiting component for many animal species. Any alteration in the availability of this essential, life-sustaining habitat component could result in devastating effects to dependent animal life. Brine evaporation pits containing concentrated salts and possibly an oil film can trap waterfowl and poison the animals drinking from these pits. The degradation of riparian habitat would result in conditions which adversely influence water quality and quantity and a wide range of fish and wildlife values, including many threatened, endangered, or sensitive species. Accidental contamination of springs or other sources of water could occur.

There are benefits for wildlife which result from oil & gas and geothermal activities. A positive aspect of exploration is the use of abandoned wells for livestock watering wells. These new water sources would benefit wildlife. Reclamation of abandoned drill pads and roads with grass, forb, and shrub species could increase plant diversity in homogenous vegetation types (e.g., creosote).

Exact locations of the animal species listed in Appendix C are not known at this time. If threatened or endangered species are identified in the future, stipulations for their protection would be developed in areas where they occur. If a listed species or its habitat were to be potentially threatened by oil & gas or geothermal activities, consultation with the U.S. Fish and Wildlife Service (USFWS) would be required.

Adverse Impacts Which Cannot be Avoided

If wells are successful, surface disturbance associated with development operations would result in the permanent loss of habitat which existed before development. Where concentrated development and human activity accompanies industry activities, habitats for certain species would still be rendered useless over considerable acreages. Illegal shooting would be a source of mortality to big game and many other animals. Accidental spills of oil or toxic substances, especially where contaminates enter water sources could cause losses. In spite of precaution, some spills could be expected.

Relationship Between Short-Term Uses and Long-Term Productivity of the Environment

With the exception of endangered species, short-term use of the lands for general exploration activities generally would not impair long-term productivity for wildlife. If oil & gas or geothermal resources are discovered, activities and development which follow could have a long-term effect on wildlife through loss of habitat. After production and abandonment, the ecosystem may never be entirely rehabilitated. Human activities during development and production may persist after production is exhausted. Thus, wildlife once found in the area may never use it again due to changes in land patterns and use. On the other hand, wildlife which were not found in the area before habitats were disturbed may find the change in vegetation type or land patterns created by the disturbances favorable.

CULTURAL RESOURCES

Affected Environment

Prehistoric and historic sites have been recorded within the WSRA over the past 60 years. The quality of the information varies considerably. Two literature searches, one on prehistoric resources (LeBlanc and Whalen, 1979) and the other on historic resources (Wilson, 1975), have been prepared for the BLM. Until the existing site information is updated and more stratified random sample surveys are conducted, few valid conclusions can be drawn.

No additional inventory has been done for this EA. Figure 5 shows areas of estimated high prehistoric site density based on the existing archaeological data.

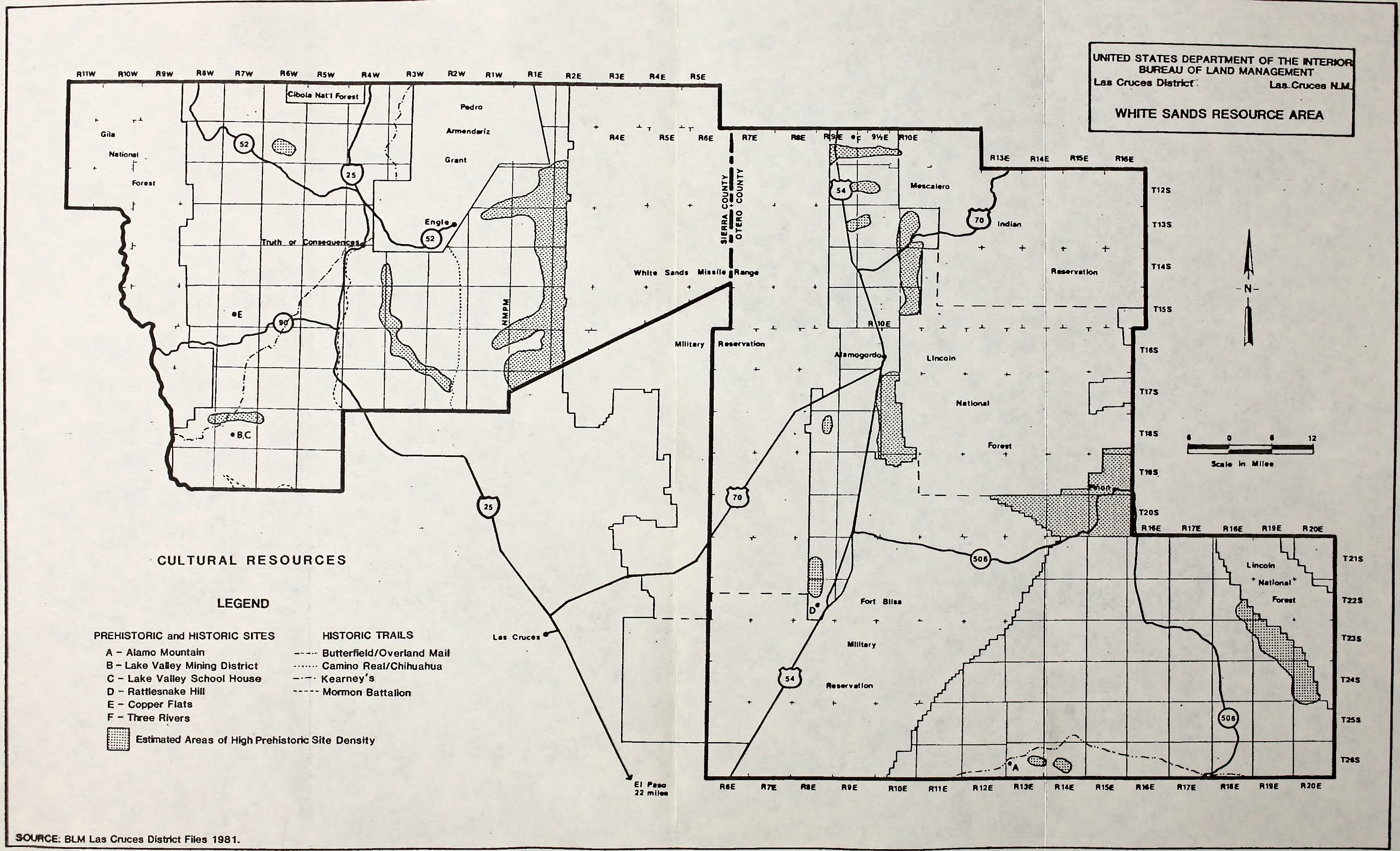
Figure 5 only helps pot hunters

Certain sites have been identified as being of special heritage value or significance and are listed on the New Mexico State Register of Historic Places or nominated to the National Register of Historic Places. Several sites on BLM managed surface or subsurface estate are on the State Register:

Alamo Mountain (#172)
Lake Valley Mining District (#559)
Lake Valley School House (#431)

Rattlesnake Hill has been nominated to the National Register. The historic mining sites in the Copper Flats area may qualify for a group nomination to the National Register (USDI, 1978). (See Figure 5 for locations).

Several historic trails cross the WSRA: Butterfield Overland Mail, Camino Real/Chihuahua (Jornada del Muerto), Kearney's Route and the Mormon Battalion Trail (Cooke's Wagon Road). (See Figure 5 for locations). More critical areas may be identified as the BLM cultural resources program develops.



SOURCE: BLM Las Cruces District Files 1981.

FIGURE 5. Cultural Resources

CULTURAL RESOURCES
LEGEND
PREHISTORIC AND HISTORIC SITES
HISTORIC TRAILS

Impacts

Cultural resources are impacted when the potential for retrieving information from sites is decreased. This happens when the archaeological materials are vertically or horizontally displaced or taken completely out of context and when materials are broken or damaged. The resource could be impacted throughout all phases of the proposed action.

If seismic lines for oil & gas and geothermal exploration are not surveyed for archaeological sites prior to off-road vehicle use, sites could be disturbed. Further disturbance would occur if other vehicles use these routes as travel ways. This would also increase access into potentially sensitive areas.

Surface disturbing activities in the Rattlesnake Hill area could disturb surface and subsurface remains. The potential for disturbance in the vicinity of Rattlesnake Hill is extremely high because of the high site-density. Even geophysical operations, which normally result in minimal impacts, could produce churning, vibration, and compaction of archaeological materials.

At Alamo Mountain, geophysical operations would probably not create significant impacts. However, drilling operations and subsequent development and production activities could destroy many of the petroglyphs and create an extreme visual impairment of these sites.

The environmental review conducted by the USGS and the BLM (and the USFWS, if related to geothermal) at the post lease phases would anticipate potential impacts by surveying large enough areas, locating surface disturbance away from sites, planning access routes to avoid high density site areas, and so on. However, some mistakes and accidents would still occur. Easier access and additional people working in the area would allow for increases in theft and the vandalizing of sites. Surveying and testing of sites would provide more information about the resource, but excavating a site severely limits its future potential for meeting any additional data needs.

post lease EA
not mentioned
in EA before
(see comment pg 1)

Because the inventory data for the WSRA is incomplete, more critical areas might exist which have not been identified in this EA. Surveys are required before any new surface disturbing activities on leases take place, and all sites which are located are protected through compliance with Section 106 of the National Historic Preservation Act of 1966. This would lessen the impacts of proceeding with the proposed action with a very limited inventory base.

Mitigating Measures

The site-specific environmental review for post-lease surface disturbing activities will contain mitigating measures where appropriate.

Certain sites identified on the State Register or sites nominated to the National Register need extra protection from impacts. A "no surface occupancy" stipulation will be attached to leases in the following location:

Rattlesnake Hill
T. 22 S., R. 8 E., NMPM
Section 21: All

It should be noted that additional mitigating measures will be required when work is proposed near any State Register or National Register eligible property.

In order to protect sites proposed for nomination to the National Register, drilling and subsequent development activities will not be allowed on the following described lands:

Alamo Mountain
T. 26 S., R. 13 E., NMPM
Section 17: S½
Section 18: E½SE¼, SW¼SE¼
Section 19: E½

Adverse Impacts Which Cannot Be Avoided

Subsurface sites in areas affected by exploration, development, production, and possibly abandonment operations, could be destroyed or damaged if they are not located during the initial cultural survey. Cultural resources could also be affected by accidents such as spills or by emergency operations conducted in response to such accidents.

Relationship Between Short-Term Uses and Long-Term Productivity of the Environment

In the long term, continued oil & gas and geothermal operations may would result in the discovery and documentation of more cultural sites. However, development and production operations may would also result in additional access, more people, and consequently more vandalism of cultural resources.

RECREATION

Affected Environment

Recreational use of public lands in the WSRA consists primarily of activities where no facilities are necessary and on-the-ground management is minimal. These include rockhounding, hiking, camping, picnicking, and general sightseeing.

Following are some of the more important recreational opportunities in the WSRA which are dependent on specific resources and which require special management attention from the BLM:

Historic Trails

Several public groups have expressed interest in the identification and protection of the four historic trails that cross the WSRA. These are the same trails mentioned in the section on Cultural Resources.

Hunting

Hunting opportunities are present throughout the WSRA. Game species include deer, pronghorn, barbary sheep, quail, waterfowl, and doves.

Off-Road Vehicles

Most ORV use is dispersed throughout the WSRA in support of hunting and other extensive recreational activities. Each winter, the Prairie Dawgs Motorcycle Club of Alamogordo sponsors an enduro in the Jarilla Mountains which attracts several hundred participants from New Mexico and neighboring states.

Caves

There are several caves in the Caballo Mountains. Numerous caves are also present on the eastern flank of the Guadalupe Mountains. An inventory of caves has not been completed nor are any being actively managed at this time.

Ojas de Las Alamos Station

The rock structures west of Alamo Mountain in the extreme south-central part of Otero County are the remains of a stage station operated by the Overland Mail Company from 1858 to 1861.

Three Rivers Petroglyph Site

This site includes over 5,000 prehistoric American Indian rock carvings and a partially excavated Indian village which was occupied from A.D. 900 to 1400. There are picnic and camping facilities, interpretive signs, and partially reconstructed prehistoric shelters. A hiking trail on the petroglyph ridge provides scenic vistas of the Three Rivers Valley and Tularosa Basin. Approximately 20,000 visitors tour the area annually. The Three Rivers Petroglyph Site is presently segregated from mineral leasing.

Tularosa Canyon

Tularosa River flows intermittently, however, it has sufficient flow in cooler seasons to be stocked with trout by the New Mexico Department of Game and Fish. Recreational use figures are not available. However, due to the proliferation of fire rings and litter, the area appears to be quite popular. Potential for increased use is high since the area is only 5 miles from Tularosa and is accessible from Highway 70.

Impacts

Generally, extensive recreational opportunities in the WSRA would not be significantly affected by exploration and production activities. There might be a slight increase in recreational use as a result of improved access.

Hunting opportunities would not be significantly affected, although the presence of additional roads may reduce opportunities for a primitive hunting experience. Increased access in some areas would improve short-term hunting opportunities.

Historic trails would be identified and protected through site-specific clearances and would not be significantly affected by the proposed action.

Surface disturbing activities in the vicinity of cave resources would be regulated on a site-specific basis and any impacts would probably be negligible.

Relatively minor surface disturbing activities (i.e., geophysical operations) in the vicinity of Ojas de Las Alamos Station would be assessed on a site-specific basis and would probably not affect this historic site. However, drilling and subsequent development operations would seriously detract from visitors' enjoyment of the site.

The Three Rivers Petroglyph Site and adjacent lands have already been segregated from leasing. Oil & gas or geothermal activities nearby could detract from visitors' enjoyment of the site. Preservation of aesthetic values in the Three Rivers vicinity is a major concern of the BLM and proposed surface disturbing activities would be carefully assessed on a site-specific basis.

Activities along the Tularosa River would degrade scenic and aesthetic values and conflict with recreational use. Road construction, disturbance of vegetation and installation of drilling rigs would create considerable contrast with the natural appearance of lands along the river. These visual impacts plus high levels of noise in the immediate vicinity of a drilling rig would severly compromise aesthetics of the area and disrupt opportunities for seclusion and recreation in a substantially unmodified riparian area. Opportunities for observing and photographing wildlife unique to a riparian area would be impaired as a result of habitat destruction and species displacement.

Mitigating Measures

In order to protect recreational opportunities along the Tularosa River, a "no surface occupancy" stipulation will be in effect on the following lands:

T. 13 S., R. 11 E., NMPM
Section 29: SW¼SE¼
Section 31: NW¼SE¼
Section 32: NE¼NW¼

Adverse Impacts Which Cannot Be Avoided

drilling avoid
caves - lost circulation
drilling fluids.

Because present technology is inadequate to detect caves without surface entrances, impacts to such caves cannot be avoided prior to exploration and drilling activities.

Occasional conflicts could arise between dispersed recreationists and exploration and drilling operations. In more isolated areas, opportunities for solitude would be reduced as a result of increased traffic.

Relationship Between Short-Term Uses and Long-Term Productivity of the Environment

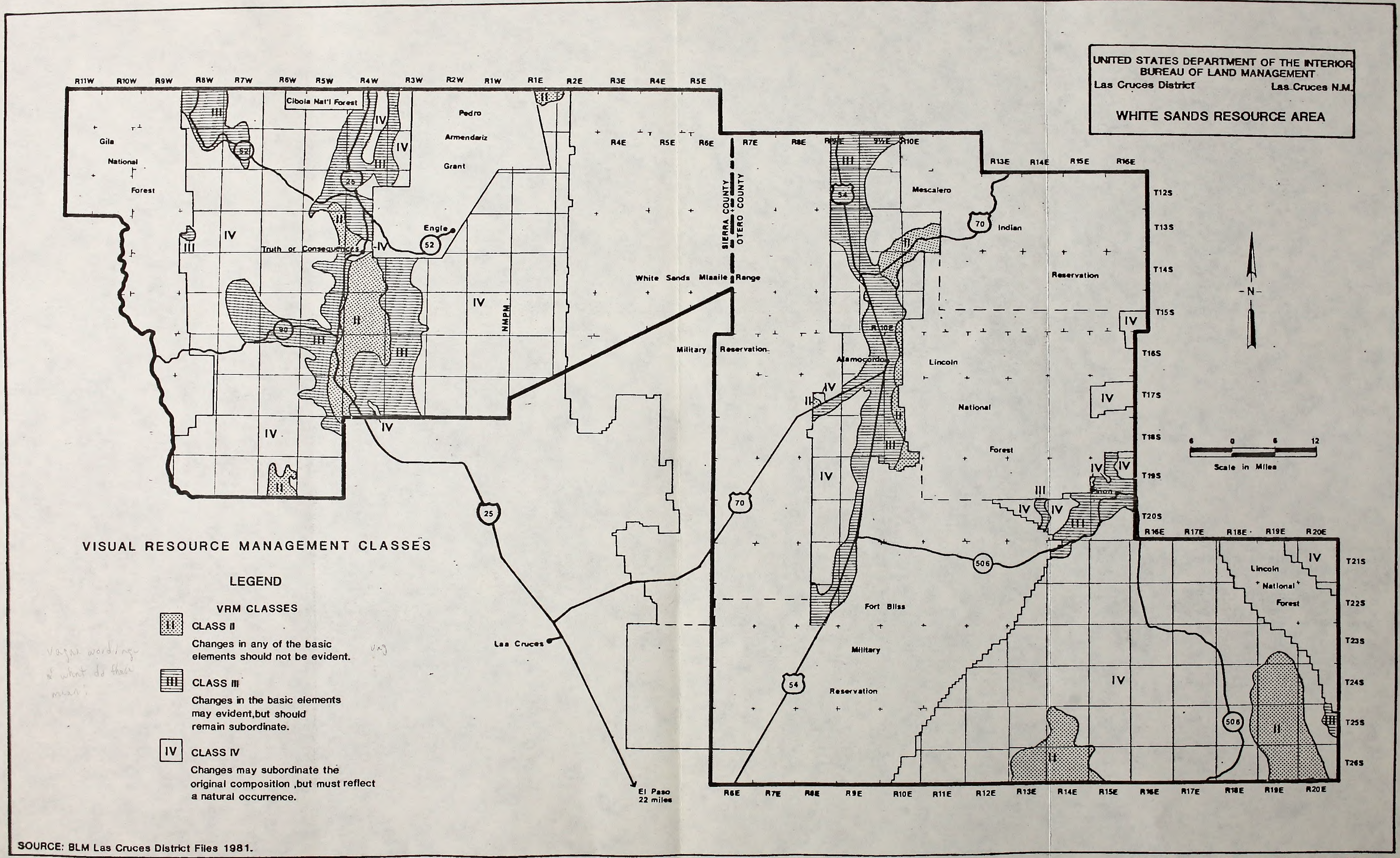
Short-term use of the public lands could result in both short-term and long-term increases in recreational use, however, development could cause a minor reduction in the quality of the recreation resource and lessen the quality of various recreational experiences (e.g., caving, primitive hunting).

VISUAL RESOURCES

Affected Environment

The WSRA is characterized by a variety of landscape types. The eastern portion consists of rolling terrain and flat mesa country which is dominated in the south by the Cornudas Mountains and in the east by the Brokeoff Mountains and the Guadalupe Escarpment. West of Otero Mesa lies the level floor of the Tularosa Basin and the Jarilla Mountains northwest of Orogrande. South of Alamogordo, the Tularosa Basin is bordered by the steep Sacramento Escarpment. East of Alamogordo and Tularosa, the basin merges more gently with the Sacramento Mountains which contain numerous escarpments and deep canyons. To the west, Sierra County is split by the Rio Grande Valley. East of the Rio Grande, the Caballo Mountains rise steeply above the valley. West of the Rio Grande, the plains rise gently to the Cuchillo Mountains and the foothills of the Black Range. East of the Caballo Mountains lies the extensive Jornada del Muerto basin.

A visual resources management (VRM) inventory has been completed and management classes assigned for the WSRA. These classes have been incorporated as base data into the BLM planning system and will be used during future planning efforts and evaluation of proposed projects (see Figure 6).



VISUAL RESOURCE MANAGEMENT CLASSES

LEGEND

VRM CLASSES

▦ CLASS II
Changes in any of the basic elements should not be evident.

▤ CLASS III
Changes in the basic elements may evident,but should remain subordinate.

IV CLASS IV
Changes may subordinate the original composition ,but must reflect a natural occurrence.

Vague wording & what do these mean?

vag

SOURCE: BLM Las Cruces District Files 1981.

FIGURE 6. Visual Resource Management Classes

The scenic quality rating unit which received the highest rating in the resource area was the Sacramento Escarpment south of Alamogordo. This formation is a precipitous escarpment which rises 2,500 feet above the floor of the Tularosa Basin and is broken by several deep and curving canyons. Its face is characterized by steep slopes and angular ridgelines which contrast sharply with the desert floor basin. This unique escarpment dominates the view of passersby and is visible for miles. Numerous groups have expressed concern over the protection of this formation and its scenic values. The escarpment does meet the necessary criteria to be identified as a potential area of critical environmental concern.

no Class I VRM areas shown on Fig 6. How then necess critera met for crit env concu what VRM class is escarpment.? Unlikely drilling occur on 2500 foot escarp.

There are five possible management classes in the VRM system. Class I provides primarily for natural ecological changes and stipulates that management activities not attract attention. Class II provides that changes in the basic element of the landscape (form, line, color, or texture) caused by a management activity should not be evident. Class III provides that changes in the basic elements caused by a management activity may be evident in the characteristic landscape, but should remain subordinate to the existing visual quality. Class IV provides that changes in the basic elements may subordinate the original composition and character of the landscape but should reflect the original form, line, color, and texture. Class V is a temporary classification which indicates that the natural character has been disturbed to a point where rehabilitation is needed.

Impacts

BLM policy states that contrasts which exceed the allowable limits for a VRM class are "significant adverse impacts". The impacts that oil & gas and geothermal operations would have on visual resources would be determined on a site-specific basis through use of the contrast rating process which is briefly described in Appendix D.

Visual resources in the WSRA would be impacted during all phases of oil & gas and geothermal activities. Impacts upon the visual resources would include the disturbance and destruction of vegetation, the clearing of soil surfaces, and the erection of structures which could contrast with the basic elements of the natural landscape. Support actitivies would also cause a variety of secondary impacts (dust, litter, off-road disturbance). These impacts would be reduced significantly following completion of the abandonment phase as disturbed areas become less noticeable due to reclamation efforts and natural restoration.

Impacts would be greatest on the west face of the Sacramento Escarpment. This area has the highest scenic quality rating of any area in the WSRA with very steep slopes where exploration and drilling activities would be difficult to conduct without severely degrading its previously undisturbed face. Road construction and site development would require much blasting and blading and subsequent disturbance of

vegetation and landform would create massive scars which would be visible from high use zones in Alamogordo and along Highway 54. Rehabilitation of these scars during the abandonment phase would be extremely difficult and, for all practical purposes, the scenic values of the escarpment would be irretrievably lost.

Mitigating Measures

Compliance with site-specific mitigating measures would reduce visual contrasts.

The one exception, where more restrictive stipulations will be needed, is the Sacramento Escarpment (Scenic Quality Rating Unit 010). This area received the highest quality rating of any unit in the WSRA and due to its proximity to Alamogordo and Highway 54, has a high sensitivity level. During the VRM inventories this area was identified as having potential as a scenic Area of Critical Environmental Concern. Exploration and development activities on the face of the escarpment would create scars which would be visible from high use zones and would be difficult to rehabilitate. In order to protect the scenic quality of the west face of the Sacramento Escarpment, a "no surface occupancy" stipulation will be in effect on the following described lands:

T. 17 S. R. 10 E., NMPM
Section 4: S½NW¼, SW¼
Section 5: E½SE¼
Section 8: E½NE¼, NE¼SE¼, S½SE¼
Section 17: E½
Section 20: E½
Section 28: All
Section 29: E½NE¼, NE¼SE¼
Section 33: N½, E½SW¼, SE¼

T. 18 S., R. 10 E., NMPM
Section 4: E½, E½W½
Section 9: E½

Due to the steep slope and lack of access on the escarpment, exploration activities would be extremely difficult if not impossible, to conduct. At the base of the escarpment are Class III lands consisting of relatively level terrain where operations could be conducted with greater ease of access and without degrading scenic values.

Adverse Impacts Which Cannot Be Avoided

During exploration and production, visual impacts would occur at reduced levels even if all standard operating procedures and mitigation measures are implemented properly. Impacts would be reduced to an insignificant level if proper measures for rehabilitation and restoration are followed during abandonment.

Relationship Between Short-Term Uses and Long-Term Productivity of the Environment

Visual resources would be altered in the short-term by site development as well as by road, pipeline and utility construction. The long-term quality of visual resources should be restored following completion of the abandonment phase.

WILDERNESS

Affected Environment

Section 603 of the Federal Land Management Policy and Management Act (FLPMA) directs the Secretary of Interior to review for their wilderness potential all roadless areas of the public lands which contain 5,000 acres or more. During this review process, the BLM is required to manage lands with wilderness potential so as not to impair their suitability for preservation as wilderness, subject, however, to the continuation of existing mining, grazing uses, and mineral leasing.

The inventory phase of the wilderness review process was completed on November 15, 1980, and two inventory units in the WSRA were found to possess the wilderness resources which meet the criteria established by Congress (size, naturalness, solitude, and recreation opportunities) and were designated as Wilderness Study Areas (WSAs). They are the Brokeoff Mountains WSA (NM-030-112) and that portion of the Jornada WSA (NM-020-055) which lies within Sierra County. (See Figure 1 and Appendix F.)

Presently, there are oil & gas leases within both WSAs. On those leases that were issued after the passage of FLPMA, exploration and development activities will be approved only if they satisfy the nonimpairment criteria of the Wilderness Protection Stipulation (Appendix E) and Interim Management Policy. On those leases issued prior to the passage of FLPMA, the Wilderness Protection Stipulation does not apply and exploration and production activities are not subject to the nonimpairment criteria.

A decision as to whether the Brokeoff Mountains WSA should be recommended for wilderness designation will be made as part of BLM's Resource Management Planning (RMP) process for the WSRA. At that time, all values, resources, and potential uses of the land will be considered through careful analysis. Most of the Jornada WSA is administered by the BLM Socorro District. Therefore, a decision for this area would be made as a part of the RMP process for the Jornada Resource Area, Socorro District. Both of these RMPs are scheduled for completion by September 1987.

Following the completion of the RMP process, the suitable and nonsuitable recommendations will be forwarded, through the Secretary of Interior and President to Congress, which will make the final decision. Mineral surveys, environmental impact statements, and other data required by FLPMA will also be submitted with the recommendations.

Impacts

On post-FLPMA leases, regulation of mineral leasing and associated development activities will be in accordance with the nonimpairment criteria of the Wilderness Protection Stipulation and Interim Management Policy. Any impacts would be temporary in nature and impairment of wilderness values would not occur.

On pre-FLPMA leases, exploration and drilling activities may occur in the same, or at a greater, manner and degree than they were occurring on October 21, 1976, even if this results in the impairment of wilderness values. As a result, portions of the wilderness study areas may be sufficiently impaired by the time a wilderness study decision is reached that they will not be suitable for wilderness designation. Natural restoration and rehabilitation of disturbed areas following abandonment of operations could erase physical impacts. However, it is doubtful that such disturbed areas would be rehabilitated to a level of being substantially unnoticeable by the time a wilderness decision is made by Congress. Therefore, it is unlikely that highly impacted areas would be designated as wilderness.

BLM policy provides that the visual character of all Wilderness Study Areas be managed as Class II (see Section on Visual Resources) and that all activities be conducted in accordance with this policy. However, cumulative impacts could still significantly degrade the natural appearance of an area.

For those lands which Congress decides not to designate as wilderness, interim management restrictions will no longer apply and the Wilderness Protection Stipulation would be removed from the lease. The wilderness resource would then no longer be protected from impairment and may eventually be altered to a state where it no longer possesses any wilderness characteristics.

Mitigating Measures

No mitigation measures, other than standard operating procedures and existing Bureau policy, are proposed.

Adverse Impacts Which Cannot Be Avoided

Impairment of wilderness values on preFLPMA leases cannot be avoided.

Relationship Between Short-Term Uses and Long-Term Productivity of the Environment

Short-term development of oil & gas or geothermal resources would impair the long-term preservation of wilderness characteristics in potential wilderness areas.

SOCIAL ECONOMICS

Affected Environment

Socioeconomic Environment

The WSRA is basically rural, sparsely populated, and typical of small community life. There is no metropolitan area within the WSRA. Government expenditures, ranching, agriculture, mining, retirement, and recreational communities comprise the economic base. Per capita income, employment, and human services are below the state average. The economy of the WSRA has not changed in recent years and the federal government continues to be very important in Sierra and Otero counties.

Rural to urban transition, combined with the shift within the nation to the sunbelt, are the predominant trends in the WSRA. Much of the growth is due to employment expansion in the government installation and the trades and services sectors. Most of the urban growth is occurring in Alamogordo, Tularosa and the retirement and recreational resort communities of Truth or Consequences, Cloudcroft and Mescalero. The increased population pressures and fixed land supply are beginning to cause competition for public land resources. Throughout the WSRA, conflicts occur among military, ranchers, environmentalists, recreationists, Indians, urban growth advocates and minerals vested interest groups. Water, however, is the restricting element in determining land use and demographic changes in the WSRA.

Social values and beliefs of the traditional Hispanics and Anglo American early settlers are attitudes of independancy, self-sufficiency and close ties to the land. These values and beliefs tend to conflict with the snow belt newcomers who have more liberal attitudes towards public lands, natural resources, the family and religion. Indian values and beliefs favor the preservation of culture and a desire to improve the educational and economic condition of the tribe.

Population

The total population of the WSRA for 1980 was 53,085. As shown in Table 2 this is an increase of ten percent from 1930. With 44,638 residents, Otero county represents 84 percent of the total WSRA population.

The majority of the population of the WSRA is concentrated in Alamogordo and Truth or Consequences. The population of the WSRA is sparsely distributed, with an average of 3.5 persons per square mile. Sierra County, particularly the Truth of Consequences vicinity, is expected to experience a net in migration of retirees and recreationists.

The age distribution of the WSRA population is somewhat different from the state average as shown in Table 3. Both counties have large numbers of young adults, but in Sierra County there is a heavy concentration of elderly persons 65 and over.

The ethnic population of the WSRA is characterized by two groups (see Table 3). The Hispanic population is concentrated in the older communities in both Otero and Sierra Counites. Most of them are direct descendants of the Spanish colonists. The rest are from the border migration from Mexico immigrants seeking a better way of life. Anglo Americans migrated to the WSRA in the early ninteenth century. Most were involved in ranching. The ranching industry is still econically important in the WSRA.

Table 2

POPULATION TOTALS

County/City	1950	1960	1970	1980	Expected Growth Rate
Otero County	14,900	37,000	41,097	44,638	8.7%
Alamogordo	6,783	21,723	23,035	24,018	
Sierra County	7,200	6,400	7,189	8,447	17.6%
Truth or Consequences	4,563	4,269	4,656	5,223	
WSRA	22,100	43,400	48,286	53,085	13.1%
State	681,200	951,000	1,017,055	1,295,474	

Source: U. S. Department of Commerce, 1981.

Table 3
POPULATION DISTRIBUTION

County	Hispanic	Anglo	Other	Over Age 65	Net Migration 10 Yr Period	Natural Increase 10 Year Period
Otero	23.7%	67%	9.3%	5.5%	-4,500	6,200
Sierra	35.8%	63.3%	0.9%	24.5%	2,200	-400
WSRA	29.7%	65.2%	5.1%	15.0%	-2,300	5,800
State	40.1%	50.0%	9.9%	8.0%	81,000	114,000

Source: New Mexico Employment Security Commission, 1979.

Table 4

EMPLOYMENT AND INCOME

County	Total Average Employment	Total Average Unemployment	Per Capita Income
Otero	12,104	8.1%	$5,725
Sierra	2,518	6.3%	$4,820
WSRA	14,622	7.2%	$5,272
State	502,000	7.8%	$5,846

Source: New Mexico Employment Security Commission, 1979.

Table 5

TRADES AND SERVICES

County/City	Services	Retail	Wholesale	Total Trades And Services Sales (x1000)
Otero	266	357	84	$79,206*
Alamogordo	209	285	28	
Sierra	98	116	11	$15,433
Truth or Consequences	83	98		

Source: New Mexico Employment Security Commission, 1979.

Notes: *Excludes Services

Employment and Income

Total employment in the WSRA is 14,622, (see Table 4). Agriculture is relatively important, particularly in Sierra County along the Rio Grande. However, the injection of government income has surpassed agriculture and now the government and trades and services sectors dominate the economy of the WSRA. This is particularly true in Otero County where Holloman Air Force Base and White Sands Missile Range have a significant impact on the local economy. In Sierra County, the trades and services sector depends highly on the in-flow of resort and retirement dollars. Ranchers in the WSRA are heavily dependent on the public lands.

Impacts

Impacts related to geophysical operations would involve the patronizing of trades and services establishments by transient crews.

Drilling activities would involve transient workers and those local residents with adaptable skills or work-related experience. Trades and services establishments would be utilized by the workers. The intensity of economic activity would depend on the extent of drilling operations.

The noticeable socioeconomic impacts would begin with the development phase and would continue through the abandonment phase. Depending on the extent and intensity of operations, short-term impacts would include rapid population increase, shortage of housing and medical and human services, overcrowded conditions in schools, and an overall strain on the infrastructure of the impacted community. Economic benefits would include rapid economic growth in the trades and services sectors, along with a number of jobs created by the oil & gas and geothermal operations.

The abandonment phase would create a short period of high unemployment and economic decline in the impacted community. Transient crews would move on to other locations. Local residents working in trades and services establishments would be laid off and would have to find other jobs locally or move to other locations.

Social impacts resulting from the proposed action would depend largely on the extent and intensity of the exploration, development and production activities. Vested interest groups in the WSRA have particular beliefs and values with respect to their area of social or economic interest. The size, duration, intensity, and adaptability of the different social and vested interest groups would be impacted. The quality of life and lifestyle would probably be disrupted or changed. Oil & gas and geothermal activities would create conflicts among environmentalists, ranchers, the military and aerospace industries, and urban growth advocates. Figure 7 illustrates the effects of oil & gas and geothermal activities on the socioeconomic environment.

Adverse Impacts Which Cannot Be Avoided

Oil & gas and geothermal development and production operations would generate economic growth in the affected community, while abandonment operations would result in a short period of economic decline. Whether these impacts are adverse or beneficial is subjective. For a particular group with values and beliefs which relate toward preservation of the environment, economic growth would be an adverse impact. Conversely, a group oriented toward economic development would view oil & gas and geothermal operations as beneficial to the community and region.

Relationship Between Short-Term Uses and Long-Term Productivity of the Environment

Short-term development and production operations would result in sacrificing total protection of the environment in favor or the economic benefits associated with energy production. In the long-term, after production operations have been abandoned, the original productivity of the environment could not be restored. The potential for forage production, wildlife habitat, recreation, and other public land uses would have suffered some loss.

over reaction
reword
what does this
have to do w/ S/E?

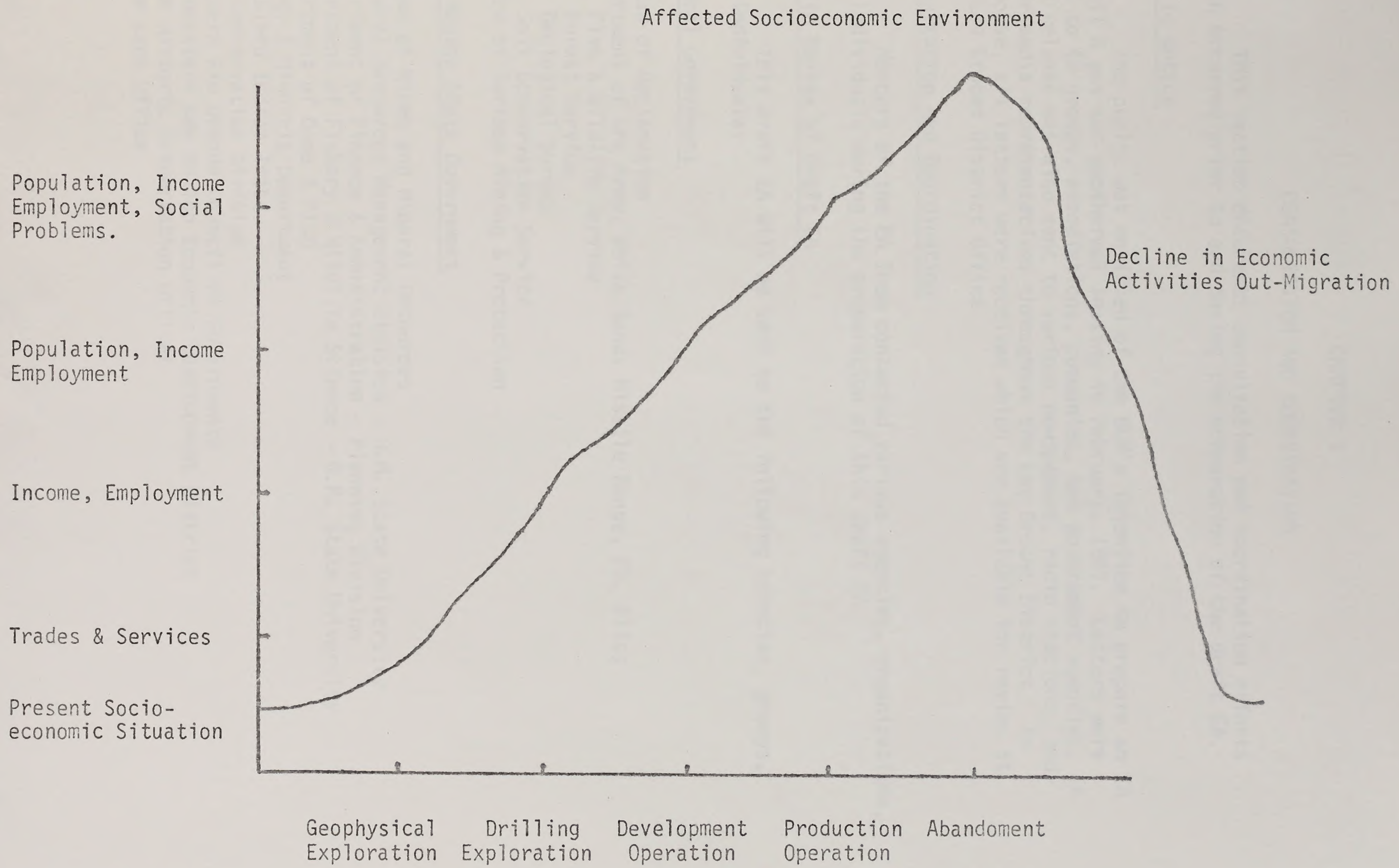

Affected Socioeconomic Environment
Population, Income Employment, Social Problems.
Population, Income Employment
Income, Employment
Trades & Services
Present Socio-economic Situation
Decline in Economic Activities Out-Migration
Geophysical Exploration
Drilling Exploration
Development Operation
Production Operation
Abandoment

Figure 7

CHAPTER 3

CONSULTATION AND COORDINATION

This section documents consultation and coordination efforts which occurred prior to and during the preparation of the draft EA.

Public Notice

The public was notified of the BLM's intention to prepare an EA on oil & gas and geothermal leasing in February, 1981. Letters were sent to 48 groups, associations, companies, and government agencies. A news release was also sent to various newspapers, radio stations, and other media representatives throughout the Las Cruces District. In response, six letters were received which are available for review at the Las Cruces District Office.

Consultation and Coordination

Members of the EA Team contacted various agencies, organizations, and individuals during the preparation of this draft EA.

Public Review of Draft EA

This draft EA will be sent to the following agencies, groups, and individuals:

Federal Government

Bureau of Reclamation
Department of the Army, White Sands Missile Range, Ft. Bliss
U.S. Fish & Wildlife Service
U.S. Forest Service
U.S. Geological Survey
U.S. Soil Conservation Service
Office of Surface Mining & Protection

New Mexico State Government

Bureau of Mines and Mineral Resources
Cultural Resources Management Division - N.M. State University
Department of Finance & Administration - Planning Division
Department of Fishery & Wildlife Science - N.M. State University
Department of Game & Fish
Energy & Minerals Department
Mescalero Indian Tribe
Oil Conservation Division
Southern Rio Grande Council of Governments
Southeastern New Mexico Economic Development District
State Historic Preservation Officer
State Land Office

Regional and Local Agencies

County Commissioners - Otero County
County Commissioners - Sierra County
Otero County Planning Commission
Southern Rio Grande Council of Governments
Southeastern New Mexico Economic Development District

Companies, Groups, Organizations

Dona Ana County Archaeological Society
El Paso Archaeological Society
El Paso 4x4 Club
Human Systems Research, Inc.
Las Cruces Jeep Club
Las Cruces ORV Club
N.M. Archaeological Council
N.M. Natural History Institute
N.M. Oil & Gas Association
N.M. Wildlife Federation
N.M. Wildlife Society
Otero County Wildlife Federation
Prarie Dawgs Motorcycle Club
Sierra Club - Rio Grande Chapter
Tularosa Basin Historical Society
Wilderness Society

Mineral Industry

Aminoil USA
Anadarko Production Co.
Atlantic Richfield Co.
Beard Oil Co.
Chevron USA, Inc.
Cities Service Oil Co.
Eastland Oil Co.
Getty Oil Co.
Gulf Oil Co.
Houston Oil and Minerals Corp.
Hunt Energy Corp.
Mobil Producing Texas and New Mexico
Phillips Petroleum Co.
Placid Oil Co.
Texaco Inc.

Other Groups and Individuals

A limited number of copes of this draft EA will be available for review at the Las Cruces District Office.

List of Preparers

This draft EA was Prepared by the following people:

Name	EA responsibility	Education	Experience
Sergio Acosta	Social Economics	B.A., Social Science New Mexico State University	BLM-1 year Social Scientist
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GLOSSARY

ANIMAL UNIT (AU). Considered to be one mature (1,000 lbs.) cow or its equivalent based upon average daily forage consumption of 26 pounds of dry matter per day.

ANIMAL UNIT MONTH (AUM). The amount of food or forage required by an animal-unit for one month.

KNOWN GEOTHERMAL RESOURCE AREA (KGRA). An area in which the geology, nearby discoveries, competitive interests, or other indicia, would engender a belief that the prospects for extraction of geothermal resources are good enough to warrant expenditures of money for that purpose.

KNOWN GEOLOGIC STRUCTURE (KGS). A trap in which an accumulation of oil or gas has been discovered by drilling and determined to be productive.

MAJOR LAND RESOURCE AREA (MLRA). Large geographic areas of land characterized by particular patterns of soil, climate, water resources, and land use.

MASS WASTING. A general term for the dislodgement and downslope transport of soil and rock material due to the force of gravity.

TOTAL DISSOLVED SOLIDS. Total dissolved solids in a water sample includes all solid materials in solution. It does not include suspended sediment, colloids, or dissolved gases.

APPENDIX A

ENVIRONMENTAL REVIEW PROCESS FOR LEASING AND EXPLORATION

Secretarial Order 2948 of October 6, 1972 and the Memorandum of Understanding for the Geothermal Program of June, 1976, set forth the relative responsibilities of the Bureau of Land Management, (BLM) U.S. Geological Survey (USGS) and the U.S. Fish & Wildlife Service (FWS) concerning the oil & gas and geothermal leasing programs. Following is a summary of the leasing and exploration permitting process for BLM adminstered lands and how the agencies' responsibilities relate to the process.

Leasing

All leases are issued by the BLM State Office having jurisdiction over the lands involved. Before issuance of the lease, the lease offer is sent to the appropriate BLM District Office to determine whether leasing is consistent with land use and environmental considerations. The District then refers to its land use planning documents and District-wide, Area wide, or other regional leasing EA (or prepares a site-specific EA if there is no regional EA) and recommends lease, no lease, or lease with special stipulations. Before issuance of the lease, the USGS must concur with oil & gas and geothermal special stipulations. Additionally, the FWS must concur with all special geothermal lease stipulations.

Exploration Permits

For permitting purposes, exploration operations fall into three categories: casual use, prelease, and post lease.

"Casual Use" refers to activities which do not ordinarily lead to any appreciable disturbance or damage to lands or resources. For example, activities which do not involve the use of heavy equipment or explosives and which do not involve vehicle movement except over established roads and trails are casual use.

Excluding casual use activities, "prelease" exploration includes various geologic, geochemical, and geophysical operations, including the drilling of shallow temperature gradient holes. A lease need not be acquired prior to conducting prelease exploration.

Persons or companies proposing to explore must file a "Notice of Intent to Conduct Oil and Gas Exploration Operations" or a "Notice of Intent to Conduct Geothermal Resource Exploration Operations" with the appropriate BLM District Office. Before authorization, all proposed exploration activities receive site-specific environmental review even though a regional EA may have already been prepared. Before authorizing prelease geothermal exploration activities, BLM must forward the proposed activities to the USGS and the FWS for their recommended

technical advice and environmental protection stipulations (this does not apply to oil & gas exploration). The BLM Office can then authorize the "Notice of Intent" with the appropriate stipulations.

Geologic core drilling, drilling for oil & gas and geothermal resources, and all subsequent development and production operations are authorized only upon the acquisition of a lease and are the exclusive rights of the lessee. Approval and monitoring of all post lease operations are the responsibility of the USGS. Lessees proposing to conduct any type of exploration operations (except casual use) on their own leases, must file an application with the USGS office having jurisdiction over the lands involved. (Oil & gas geophysical exploration is an exception. BLM commonly authorizes these activities even though they may be post lease). After receiving the application, the USGS requests a joint field inspection with BLM (and FWS if geothermal operations are involved). After conducting an environmental review, USGS may then authorize the proposed operations with their environmental protection stipulations and those recommended by BLM (and FWS).

APPENDIX B

STANDARD OPERATING PROCEDURES

For the purposes of this EA "standard operating procedures" refers to those mitigating measures which are related to various federal and state laws, regulations, and legislative requirements. Following are sources of environmental protection requirements applicable to oil & gas and geothermal operations. The list is not complete but does include sources most commonly used by BLM and USGS.

43 CFR 3045 - (Title 43 Code of Federal Regulations Subpart 3045) Geophysical Exploration - Oil & Gas.

43 CFR 3109 - Surface Management Requirements - Oil & Gas.

30 CFR 221 - Oil & Gas Operating Regulations.

43 CFR 3204 - Surface Management Requirements - Geothermal.

43 CFR 3209 - Geothermal Resources Exploration Operations.

30 CFR 270 - Geothermal Resources Operations.

BLM Manual 3045 - Surface Management Requirements for Geophysical Exploration - Oil & Gas.

BLM Form 3109-3 - Stipulation for Lands Under Jurisdiction of Department of Agriculture.

BLM Form 3109-5 - Surface Disturbance Stipulations - Oil & Gas.

Supplements to BLM Form 31095 - Protection of Cultural and Paleontological Resources and Protection of Threatened or Endangered species.

BLM Forms 3110-2 and 3120-7 - Oil & Gas Lease

BLM Form 3200-21 - Geothermal Resources Lease

BLM Form 3040-1 - Notice of Intent to Conduct Oil & Gas Exploration Operations.

BLM Form 3200-9 - Notice of Intent to Conduct Geothermal Resource Exploration Operations.

Geothermal Resources Operational Orders (U.S. Geological Survey).

Notices to Leases and Operators of Onshore Federal and Indian Oil and Gas Leases (U.S. Geological Survey).

APPENDIX C-1

FEDERAL ENDANGERED, PROPOSED, CANDIDATE AND STATE SENSITIVE PLANT SPECIES WHICH OCCUR IN THE WHITE SANDS RESOURCE AREA

Scientific Name	Common Name	OCCURRENCES IN ASSESSMENT AREA	HABITAT
Echinocereus lloydii Status FL/E 1/	Lloyd's hedgehog cactus	Known to occur in the hills west of Orogrande, NM, in Otero County.	Very arid hillsides and tops of hills with weathered metamorphic limestone substrate, on south and southeast-facing slopes.
Hedeoma todsenii Status P	Todsen's penneyroyal	San Andres Mountains in northern Sierra County.	Gravelly limestone slopes with scattered pinyon-juniper.
Argemone pleiacantha ssp. pinnatisecta Status UR	Prickly poppy	A few plants may occur on BLM lands just west of the boundary of the National Forest in Otero County.	Grassy flats or (especially) in disturbed areas in pinyon and juniper.
Lesquerella aurea Status UR	Bladderpod	May occur along the Sacramento Mountains, but is mostly east of assessment area in Otero County.	On limestone in dry areas. Seems to prefer south facing slopes or road cuts.
Muhlenbergia villosa Status UR	Hairy muhly	Known in Otero County on western Otero Mesa.	Arid grassland on limestone-derived soils.
Pediocactus papyracanthus Status UR	Grama grass cactus	Occurs irregular in Southern part of the State, it has been identified in eastern Sierra County in the Tularosa Basin.	Sandy soils on open slopes or flats in grassland, often among pinyon and juniper.
Penstemon alamosensis Status UR	Alamo penstemon	Known from the west slope of Sacramento Mountains in Otero County. Recently was discovered in the San Andres Mountains and possible chance of occurring in the Caballo Mountains, Sierra County.	Chihuahuan desert type. Grey limestone rock ledges or in crevice of limestone in dry washes. Usually occurring on north or northeast facing slopes.
Rosa stellata Status UR	Desert rose/wild rose	Frequent in the Sacramento Mountains and can be expected to occur on, or very near to the Las Cruces District in Sierra County.	Pinyon-juniper vegetation types. Open, dry, rocky slopes, arroyos, and road cuts.
Helianthus laciniatus ssp. crenatus Status UR	none	Collections have been made in the vicinity of Truth or Consequences, N.M., and Rio Grande Valley, Sierra Co.	River bottoms, disturbed soils.
Coryphantha duncanii Status UR	Duncan corycactus	Hills west of Truth or Consequences, N.M., Sierra County.	Desert shrub. Rocky areas.
Astragalus castetteri Status UR	none	San Andres Mountains and west face of the Caballo Mountains in Sierra County.	Steep, dry limestone slopes with pinyon and juniper.
Tradescantia wrightii Status SS	Spiderwort	Occurs in Dog Canyon with good probability of species occurring elsewhere in Southern Sacramento Mountains, Otero County. A specimen has also been collected in Sierra County, Caballo, N.M.	Grows on limestone slopes which hold soil water for short periods of time also under rocky ledges in limestone.
Aletes filifolius Status SS	none	Previous sightings in the Tularosa Area, Otero County.	On rocky slopes of canyons, commonly associated with limestone derived soil, with pinyon and juniper.
Perityle staurophylla var. homoflora Status SS	none	In Otero County, present on the western slopes of the Sacramento Mountains; throughout the San Andres Mountains and on the west face of the Caballo Mountain, Sierra County.	Cracks and crevices in limestone cliffs in the upper part of the creosote bush zone and in the pinyon-juniper zone.
Limonium limbatum Status SS	Sea lavender	Species appears to be widespread in saline habitats of the Tularosa Basin, Otero County.	Alkaline flats and sink areas where ample moisture is present fo a considerable period of time. May also occupy ditch bank habit
Epipactis gigantea Status SS	Helleborine	Western Sacramento Mountains, Otero County.	Prefers soils of limestone substrate, on moist areas along stream banks or beds.
Crypthantha paysonii Status SS	none	Known from Berrenda Creek, Sierra County.	Limestone hills.
Pseudocymopterus longiradiatus Status SS	Mountain parsley	Western Sacramento Mountains, Otero County.	Canyon bottoms among rocks in association with overstory of desert shrubs.

APPENDIX C-1 (concluded)

Scientific Name	Common Name	OCCURRENCE IN ASSESSMENT AREA	HABITAT
Nama tenue Status SS	none	Eastern Sierra County, around Hillsboro, N.M.	Limestone hills.
Amsonia longifolia Status SS	none	Alamogordo, N.M., area including west Sacramento Mountains in Otero County.	Ranges from steep hillsides of limestone to base of foothills, arroyos and washes.
Zephyranthes longifolia Status SS	Rain lily	West Sacramento Mountains, Otero County.	Grows in limestone crevices and steep north-facing slopes.
Sophora gypsophila guadalupensis Status SS	Chicalote	Northeast of Alamogordo, N.M., Otero County.	Exists on sandy soils in semi-riparian situations.
Coryphantha vallardii Status SS	none	Along west face of Sacramento Mountains, Otero County.	Outcrops of limestone.
Thelypodiopsis purpusii Status SS	none	East of Alamogordo, N.M., Otero County.	Barren areas near limestone cliffs.
Tetradymia filifolia Status SS	Narrow-leaf horse-brush	Known only from type locality near Tularosa, N.M.	Gypsiferous soils.
Ferocactus hamatacanthus Status SS	none	Extreme southern Otero County.	Low, rocky hills.
Sibara grisea Status SS	none	Sacramento Mountain along western face, Otero County.	Abundant in limestone cliff areas, sometimes found appressed against rock, shady areas.

Sources: Federal Register. December 15, 1980. Dept. of Interior, Fish and Wildlife Service. "Endangered and Threatened Wildlife and Plants: Review of plant taxa for listing as endangered or threatened species."

Hreha A.M. and Kass R.J. November 1979. "A Collection of rare, threatened and endangered plant species data in the Sacramento range EIS area, New Mexico." Layton, Utah: Meiiji Resource Consultants. Contract No. YA-512-CT9-40.

New Mexico State Heritage Program. March 1981. "A computer printout of species selected as special concern elements." Santa Fe, New Mexico.

Spellenberg, R. June 1978. "Review of Federally "threatened" or "endangered" plant species in the Las Cruces District of the Bureau of Land Management, U.S. Dept. of Interior." Las Cruces, N.M.: Spellenberg Consultants. P.O. No. NM-915-PH8-365.

Notes: 1/ Status

FL/E - Federal Listed - Endangered
P - Proposed (Species that have been proposed for listing under the Act, but for which final actions has not yet been taken).
UR - Under Review (Species designated as "candidate species" by FWS).
SS - State Sensitive (Species selected by the New Mexico Heritage Program as a special concern element).

APPENDIX C-2

FEDERAL AND STATE ENDANGERED ANIMAL SPECIES WHICH OCCUR IN THE WHITE SANDS RESOURCE AREA

Scientific Name	Common Name	OCCURRENCE IN ASSESSMENT AREA	HABITAT
Cynomys ludovicanus spp. Status SE-II 1/	(Tularosa) Black-tailed prairie dog	Found in Sierra County in the Tularosa Basin area in Otero County on Otero Mesa.	Grasslands
Phalacrocorax olivaceus Status SE-II	Olivaceous cormorant	Primarily exists around Elephant Butte Reservoir but has also been recorded occasionally in the Rio Grande Valley in Sierra County.	Riparian, Lakes, Rivers. Generally requires trees, near water for nesting.
Ictinia mississippiensis Status SE-II	Mississippi kite	Southern Rio Grande Valley in Sierra County mainly during the summers.	Low and riparian woodlands and planted groves which are used for perching, roosting and nesting.
Buteogallus anthracinus anthracinus Status SE-I	Black hawk	Occurs rarely in the Rio Grande Valley.	Characteristically found in cottonwood and other woodlands along permanent lowland streams and rivers.
Haliaeetus leucocephalus Status FE/SE-II	Bald eagle	In winter and migration the species is relatively widespread and even locally common in the state especially along major rivers and around bodies of water (Elephant Butte & Caballo Lake).	Most often on or near lakes or rivers where fish are abundant. Rock pinnacles, cliffs, and trees near water are important for nesting.
Falco peregrinus anatum Status FE/SE-I	Peregrine falcon	Present records around Caballo Reservoir in Sierra County and Alamogordo in Otero County occurs statewide in migration and winter.	Cliffs that are typically high and near water are preferred nest sites. Open country.
Falco femoralis septentrionalis Status SE-I	Aplomado falcon	Historic records of species occurrence in Southern Sierra County have been verified.	Typically associated with yucca grasslands and adjacent shrubby habitats at lower elevations.
Grus americana Status FE/SE-II	Whooping crane	Rio Grande Valley, Elephant Butte, and Caballo Reservoirs receive use from migrating birds. Some winter use in this area is likely to occur.	Riparian, marshes and cultivated fields.
Sterna albifrons athalassos Status SE-II	(Interior) Least tern	May occur in Otero County during migration.	Typically associated with water.
Melanerpes erythrocephalus caurinus Status SE-II	Red-headed woodpecker	Summers primarily along central Rio Grande Valley possible occurrence in Sierra County not likely.	Strictly associated with lower elevation riparian woodlands and planted groves of trees.
Vireo bellii Status SE-II	Bell's vireo	Confirmed sightings of this species have been recorded in Sierra County.	Prefers thickets of dense shrubland or woodland along streams or rivers with willows, mesquite, and seepwillows being characteristic plant species.
Passerina versicolor Status SE-II	Varied bunting	Rare; one unconfirmed sighting in the vicinity of Elephant Butte Reservoir.	Mesquite and other semi-arid or desert vegetation in canyon bottoms or near stream areas.
Ammodramus bairdii Status SE-II	Baird's sparrow	Historically migrated almost statewide. No records in Sierra County. May occur in Otero County or Otero Mesa.	Shrubby shortgrass types.
Calcarius mccownii Status SE-II	McCown's longspur	Winters in New Mexico with the most recent records in southern part of state including Sierra County.	Prefer shortgrass types. Frequently utilize stock water ponds.
Elaphe subocularis Status SE-II	Trans-Pecos rat snake	Present records indicate this species is present in Sierra County near Elephant Butte/Caballo Reservoirs.	Rocky areas supporting shrubby vegetation.
Lampropeltis pyromelana pyromelana Status SE-II	Sonora mountain kingsnake	Uncommon to rare in Sierra County.	Mountainous areas, with brushy rocky canyons, talus slopes and near streams or rivers.
Notropis simus Status SE-I	Bluntnose shiner	Found in Rio Grande in New Mexico.	Main channel of Rio Grande, often below obstructions.

APPENDIX C-2 (concluded)

Scientific Name	Common Name	OCCURRENCES IN ASSESSMENT AREA	HABITAT
Hybognathus nuchalis Status SE-II	Silvery minnow	Historical occurrence in mainstream of Rio Grande, Sierra County.	Occupies quiet water in pools and backwaters of large streams and rivers. Soft bottoms in these pools are prefered areas for feeding and spawning.

Source: Handbook of Species Endangered in New Mexico, 1979. New Mexico Department of Game and Fish.

Notes: 1/ Status Code
- FE - Federal Endangered
- SE-I - State Endangered, Group I (Species whose prospects of survival or recruitment in state are in jeopardy).
- SE-II - State Endangered, Group II (Species whose prospects of survival or recruitment within the state may become in jeopardy in the foreseeable future).

APPENDIX D

VISUAL RESOURCE MANAGEMENT

The Bureau's Visual Resources Management (VRM) program has two phases: (1) determination of permanent or interim VRM classes; and (2) determination of contrast ratings for proposed projects. The rating process allows the evaluator to describe the existing landscape features of land surface, vegetation, and existing structures and the impact that an activity would have on their basic elements of form, line, color, and texture. This contrast rating not only provides an opportunity to evaluate the visual impact of the proposed action but also serves as a guide to identify potential mitigating measures.

The significance of impacts can be evaluated by comparing contrast rating scores (30 being the maximum possible score - indicating the most severe visual impacts), with minimal standards for a prescribed VRM class, or the scenic value for an area of critical environmental concern. These standards are:

Class I

The degree of contrast for any one element may not exceed a weak degree of contrast and the total contrast rating for any feature may not exceed 10.

Area of Critical Environmental Concern for Scenic Values - The degree of contrast for any one element should not exceed a moderate degree and the total contrast rating for any feature may not exceed 10.

Class II

The degree of contrast for any one element should not exceed a moderate degree and the total contrast rating for any feature may not exceed 12.

Class III

The degree of contrast for any one element should not exceed a moderate value and the total contrast rating for any feature may not exceed 16.

Class IV

The total contrast rating for any feature should not exceed 20.

Class V

An interim classification for an area in need of rehabilitation. Based upon its indicated potential VRM class, the feature must meet the appropriate degree of contrast for the intended class.

APPENDIX E

WILDERNESS PROTECTION STIPULATION

By accepting this lease, the lessee acknowledges that the lands contained in this lease are being inventoried or evaluated for their wilderness potential by the Bureau of Land Management (BLM) under Section 603 of the Federal Land Policy and Management Act of 1976, 90 Stat. 2743 (43 USC Sec. 1782), and that exploration or production activities which are not in conformity with Section 603 may never be permitted. Expenditures in leases on which exploration drilling or production are not allowed will create no additional rights in the lease, and such leases will expire in accordance with law.

Activities will be permitted under the lease so long as BLM determines they will not impair wilderness suitability. This will be the case either until the BLM wilderness inventory process has resulted in a final wilderness inventory decision that an area lacks wilderness characteristics, or in the case of a wilderness study area, until Congress has decided not to designate the lands included within this lease as wilderness. Activities will be considered nonimpairing if the BLM determines that they meet each of the following three criteria.

(a) It is temporary. This means that the use or activity may continue until the time when it must be terminated in order to meet the reclamation requirement of paragraphs (b) and (c) below. A temporary use that creates no new surface disturbance may continue unless Congress designates the area as wilderness so long as it can easily and immediately be terminated at that time if necessary to management of the area's wilderness.

(b) Any temporary impacts caused by the activity must, at a minimum, be capable of being reclaimed to a condition of being substantially unnoticeable in the wilderness study area (or inventory unit) as a whole by the time the Secretary of the Interior is scheduled to send his recommendations on that area to the President, and the operator will be required to reclaim the impacts to that standard by that date. If the wilderness study is postponed, the reclamation deadline will be extended accordingly. If the wilderness study is accelerated, the reclamation deadline will not be changed. A full schedule of wilderness studies will be developed by the Department upon completion of the intensive wilderness inventory. In the meantime, in areas not yet scheduled for wilderness study, the reclamation will be scheduled for completion within 4 years after approval of the activity. (Obviously, if and when the Interim Management Policy ceases to apply to an inventory unit dropped from wilderness review following a final wilderness inventory decision of the BLM State Director, the reclamation deadline previously specified will cease to apply.) The Secretary's schedule for transmitting his recommendations to the President will not be changed as a result of any unexpected inability to complete the reclamation by the specified date, and such inability will not constrain the Secretary's recommendation with respect to the area's suitability or nonsuitability for preservation as wilderness.

The reclamation will, to the extent practicable, be done while the activity is in progress. Reclamation will include the complete recontouring of all cuts and fills to blend with the natural topography, the replacement of topsoil, and the restoration of plant cover at least to the point where natural succession is occurring. Plant cover will be restored by means of reseeding or replanting, using species previously occurring in the area. If necessary, irrigation will be required. The reclamation schedule will be based on conservative assumptions with regard to growing conditions so as to ensure that the reclamation will be complete and the impacts will be substantially unnoticeable in the area as a whole by the time the Secretary is scheduled to send his recommendations to the President. ("Substantially unnoticeable" is defined in Appendix F of the Interim Management Policy and Guidelines for Lands under Wilderness Review.)

(c) When the activity is terminated, and after any needed reclamation is complete, the area's wilderness values must not have been degraded so far, compared with the area's values for other purposes, as to significantly constrain the Secretary's recommendation with respect to the area's suitability or nonsuitability for preservation as wilderness. The wilderness values to be considered are those mentioned in section 2(c) of the Wilderness Act, including naturalness, outstanding opportunities for solitude or for primitive and unconfined recreation, and ecological, geological or other features of scientific, educational, scenic, or historical value. If all or any part of the area included within the lease-hold estate is formally designated by Congress as wilderness, exploration and development operations taking place or to take place on that part of the lease will remain subject to the requirements of this stipulation, except as modified by the Act of Congress designating the land as wilderness. If Congress does not specify in such act how existing leases like this one will be managed, then the provisions of the Wildernsss Act of 1964 will apply, as implemented by rules and regulations promulgated by the Department of the Interior.

APPENDIX F

LOCATIONS OF RECOMMENDED MITIGATING MEASURES

Note: Locations of mitigating measures No. 6 and 7 are not shown. They will apply to all leases issued throughout the WSRA.

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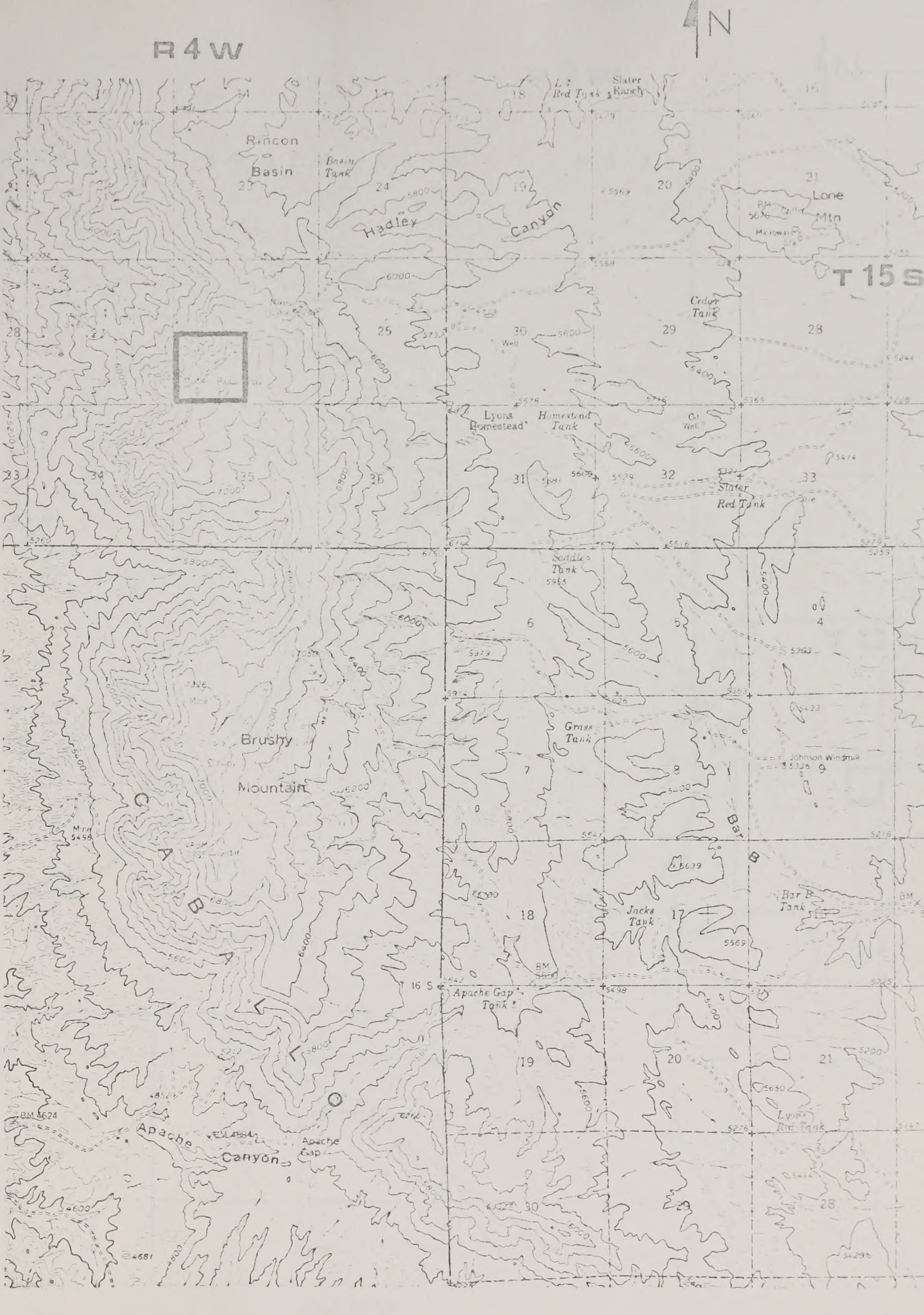

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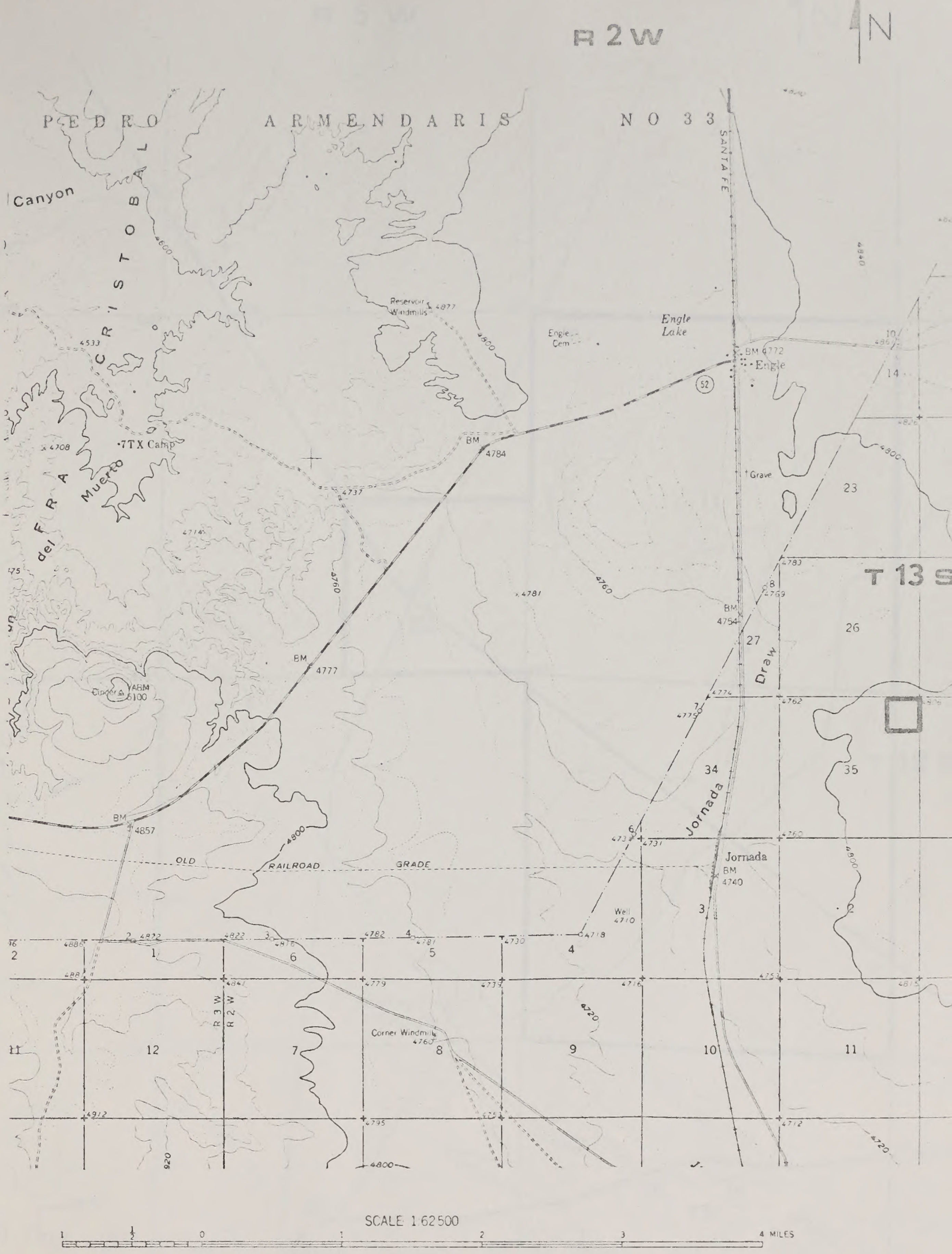

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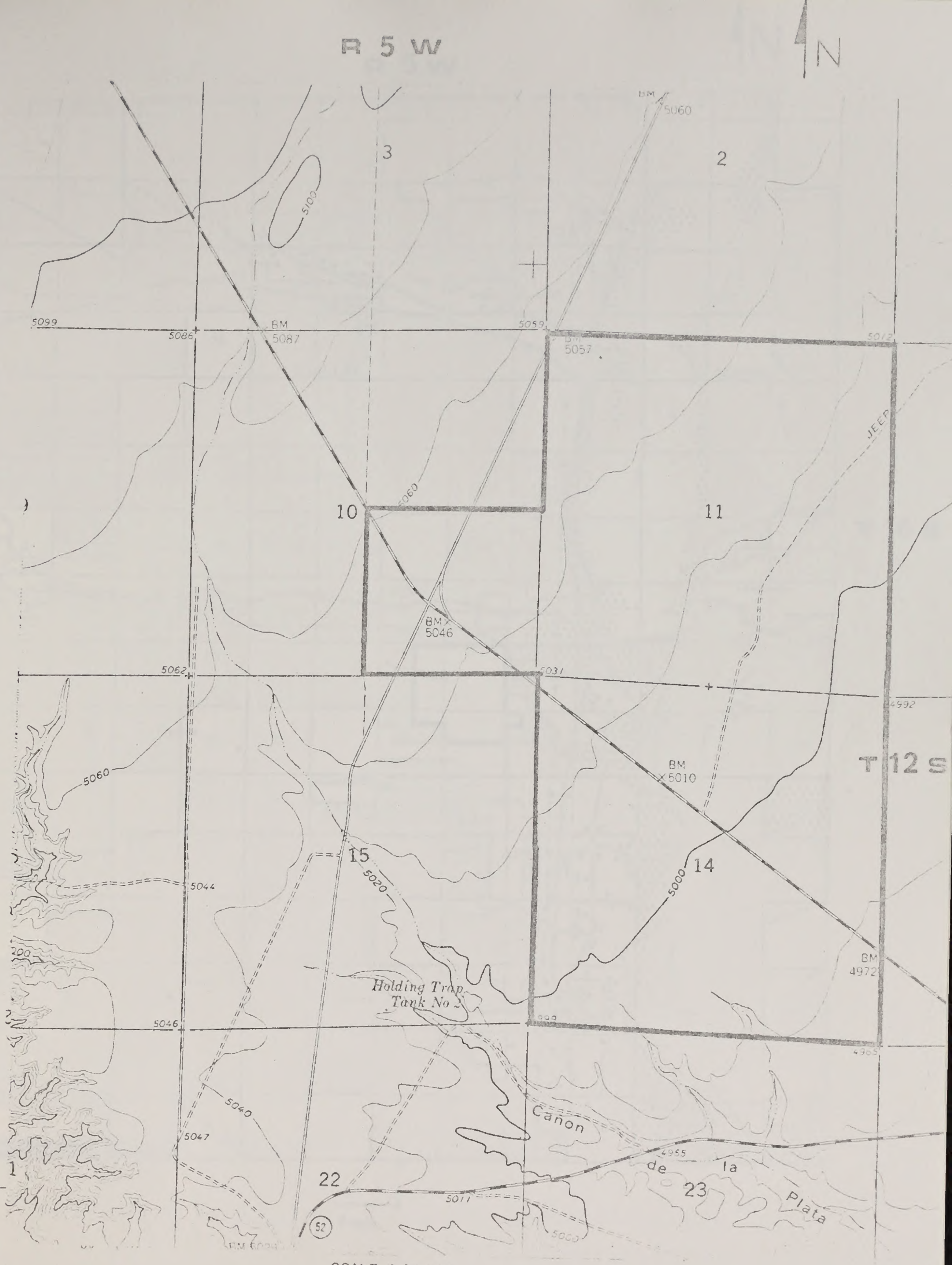

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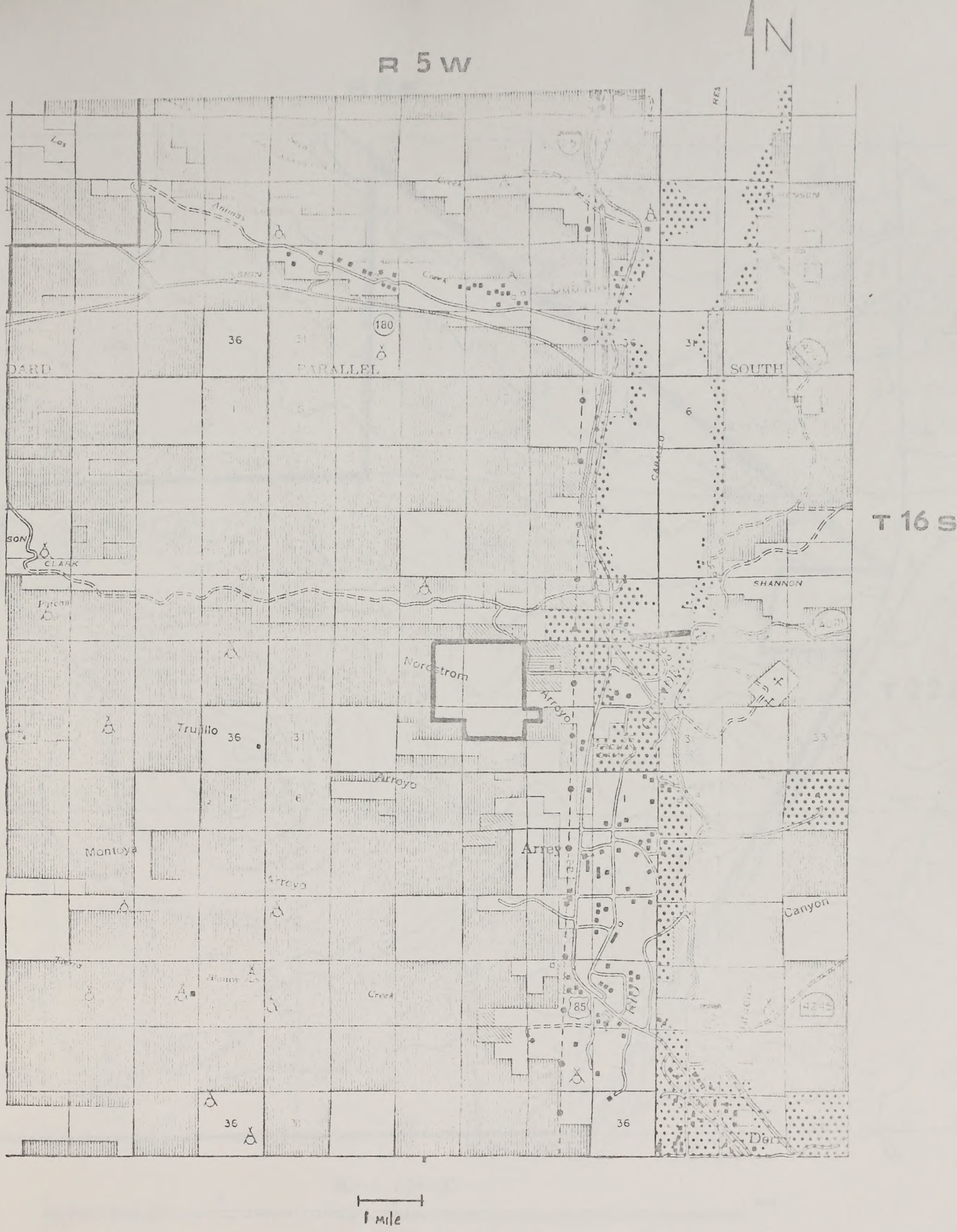

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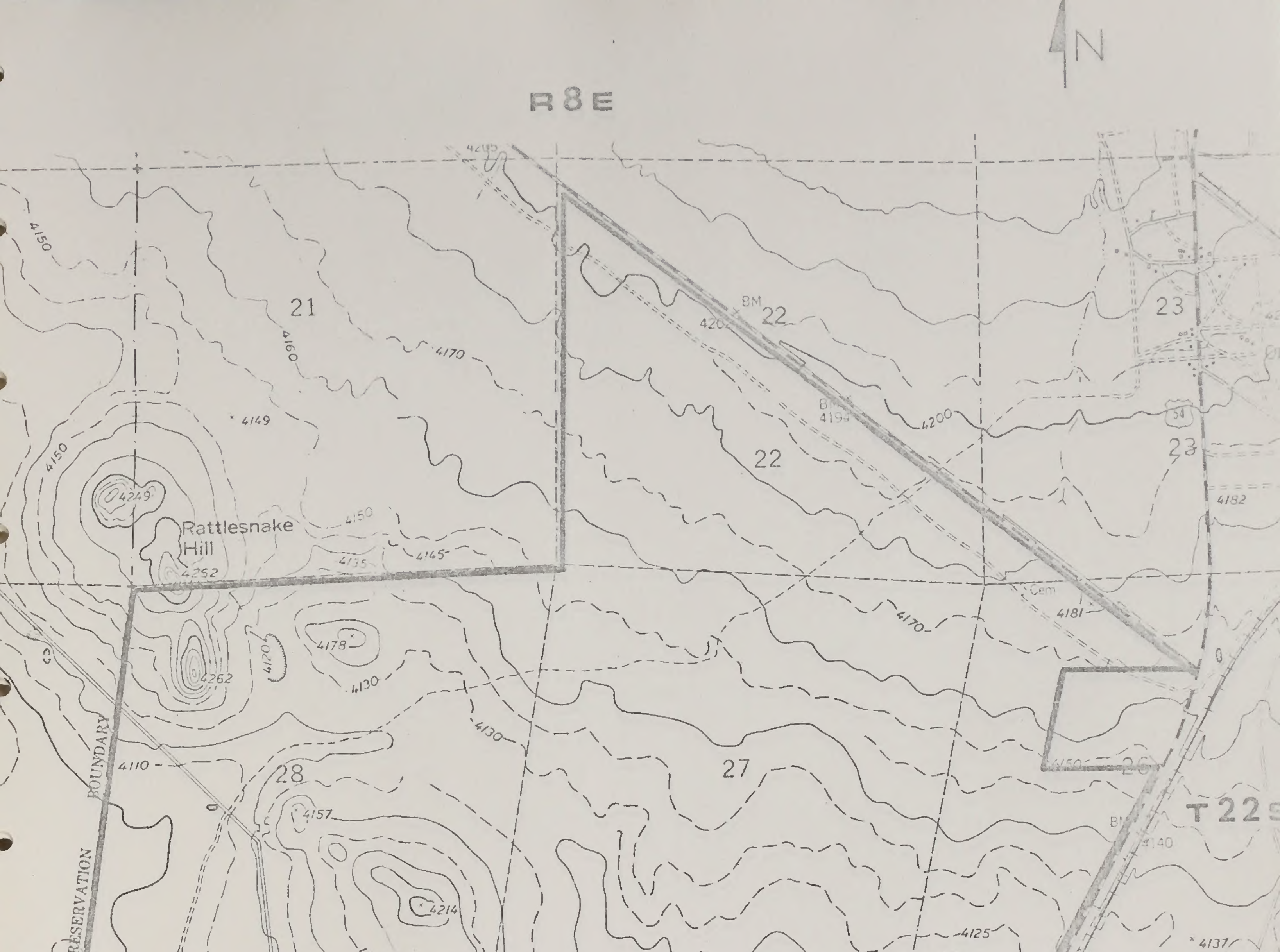

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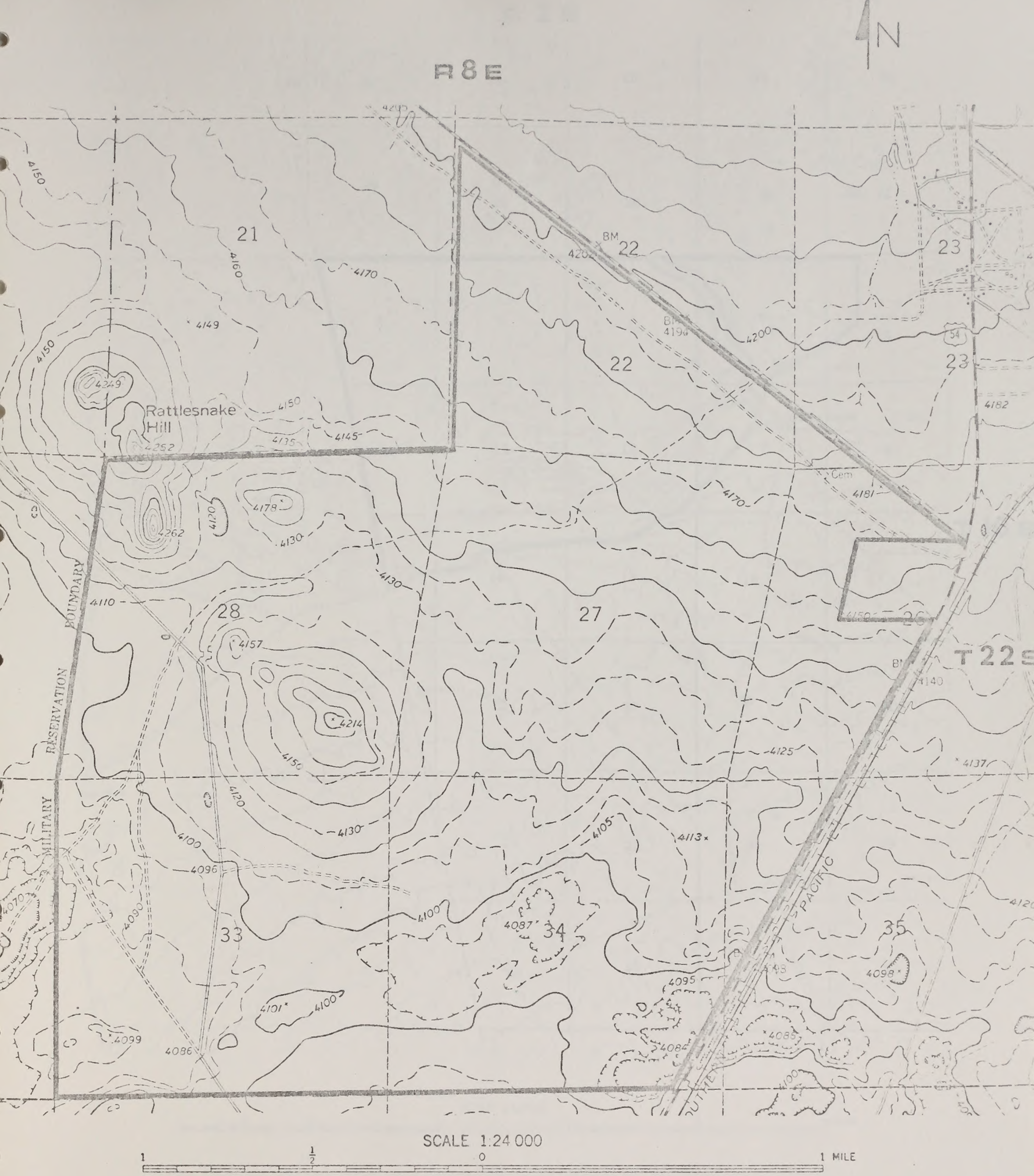

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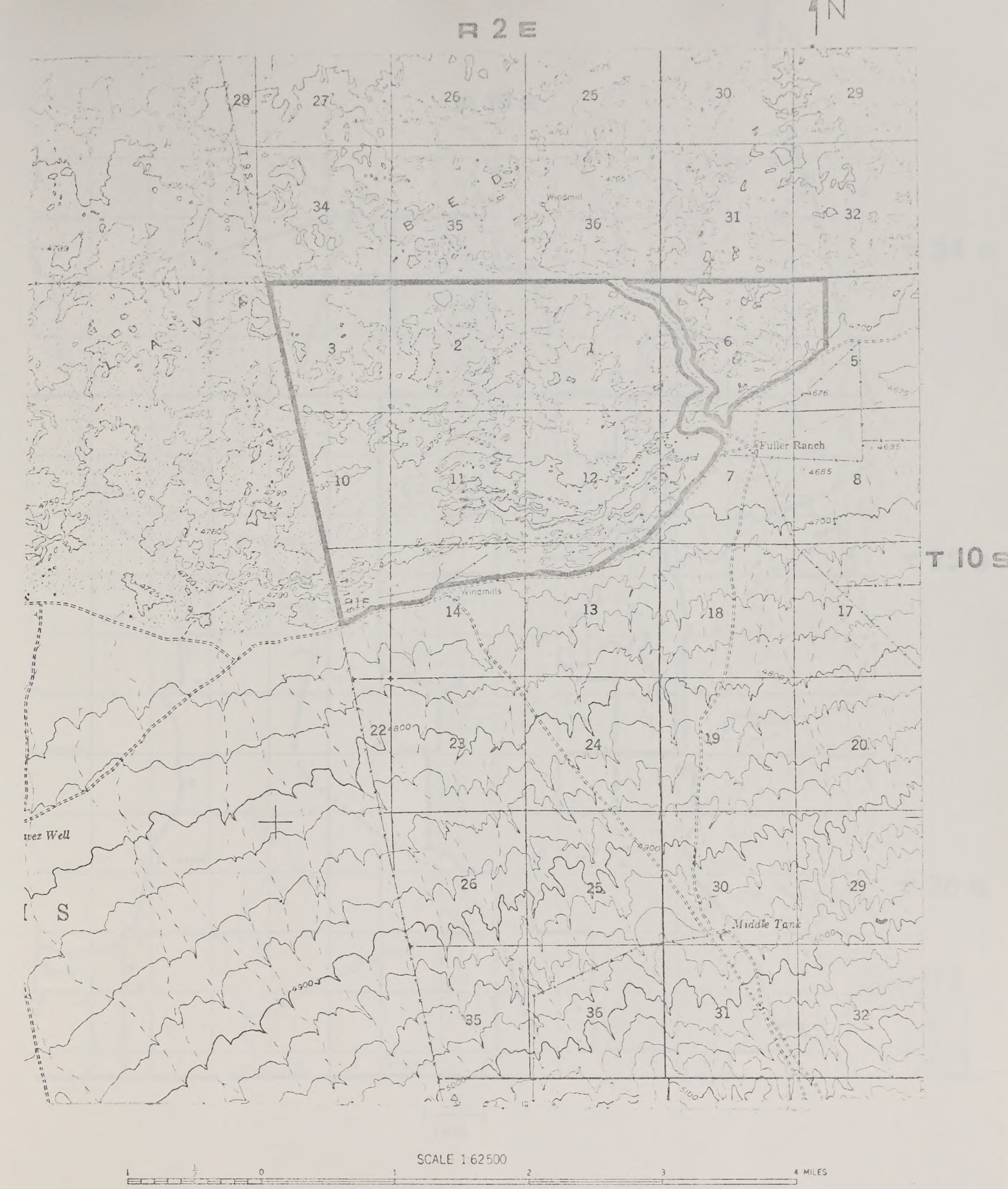

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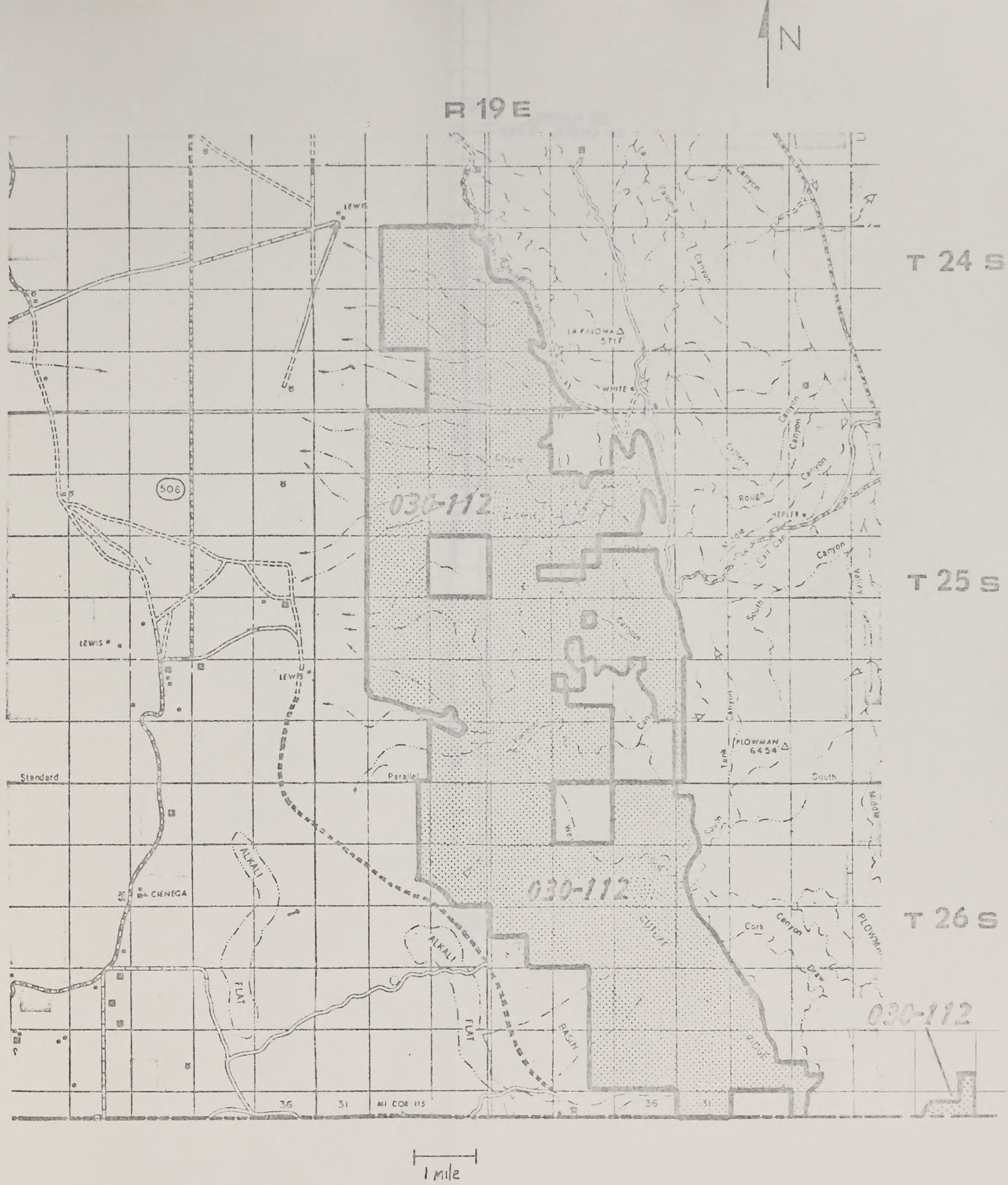

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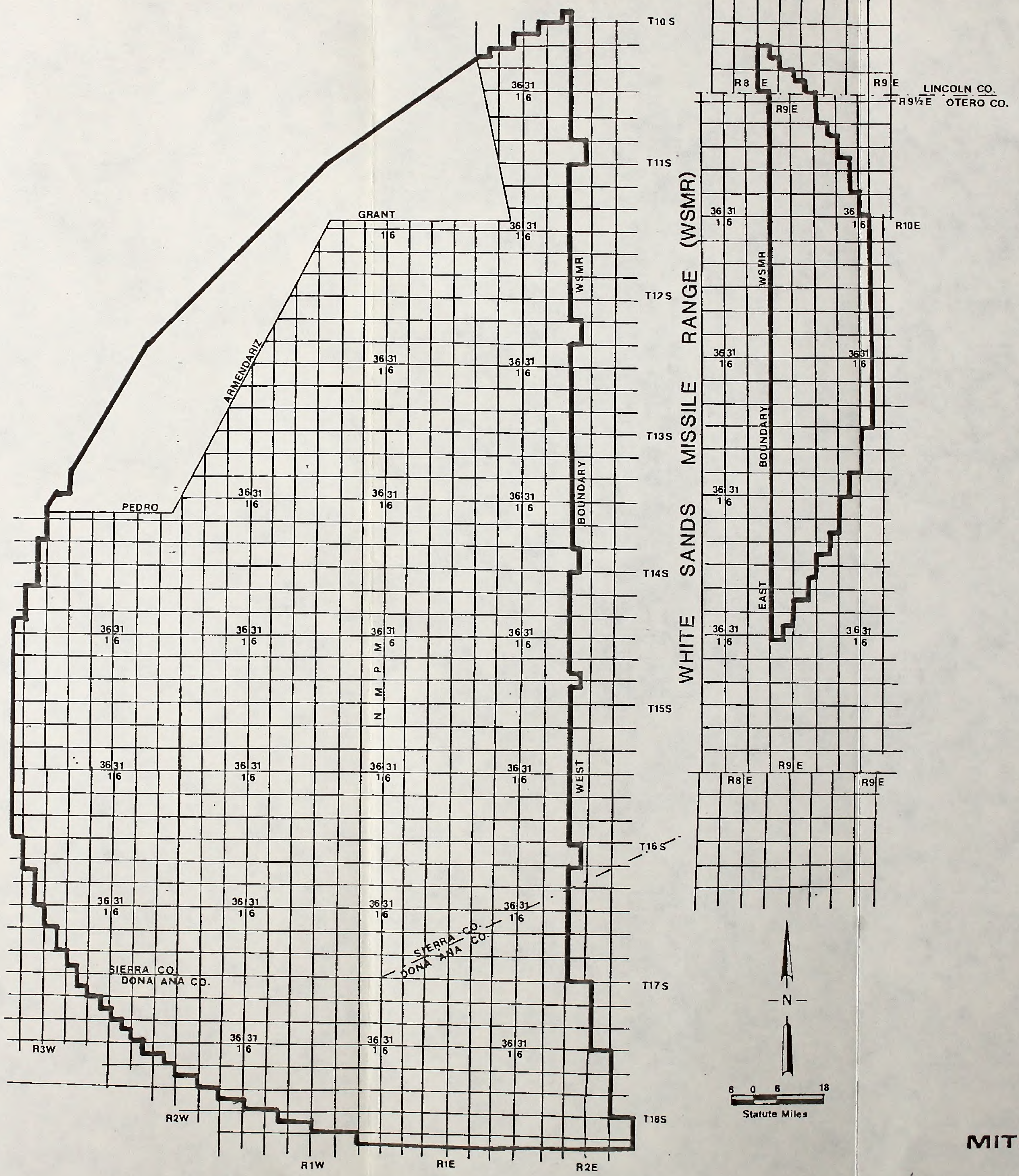

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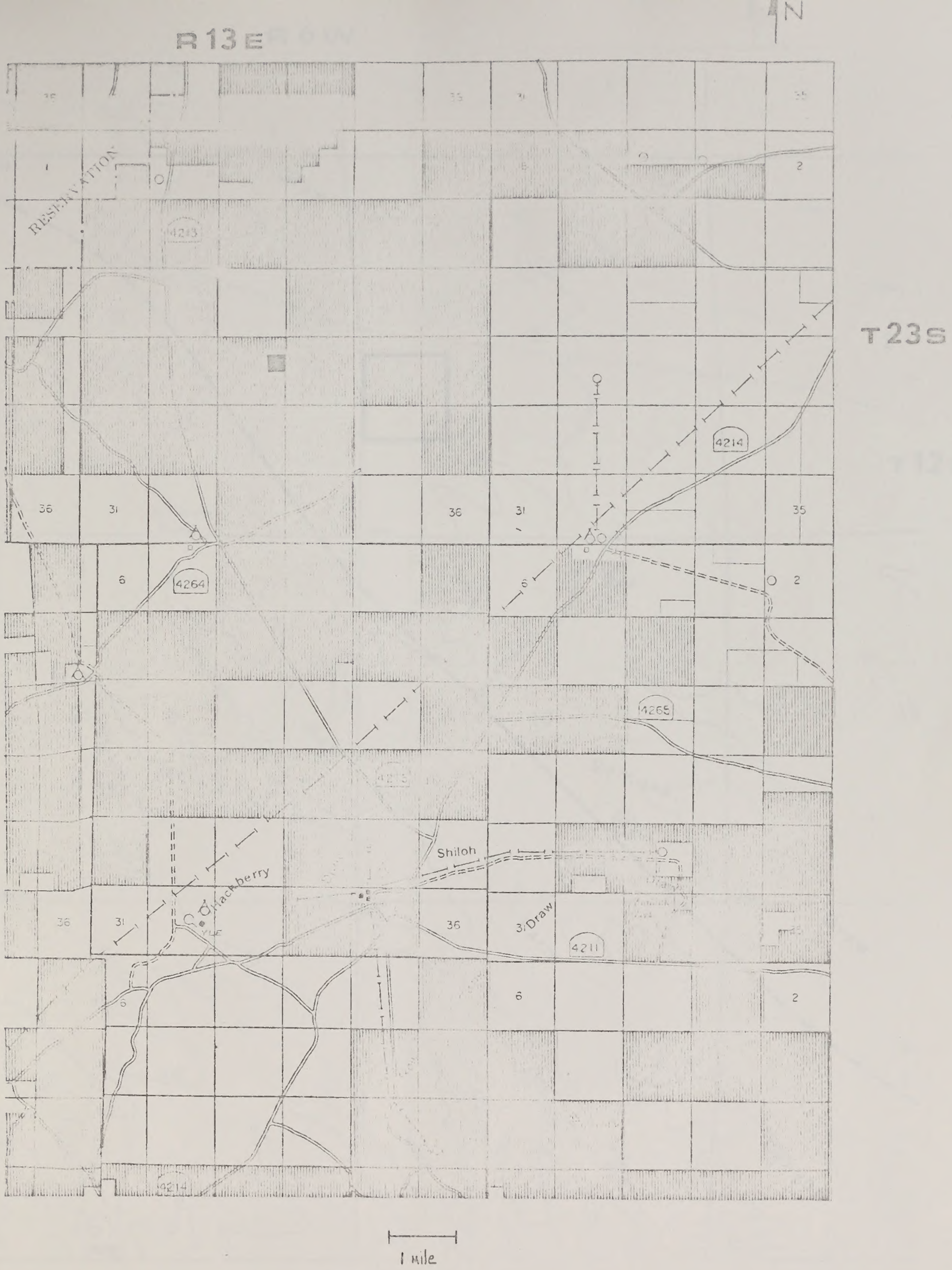

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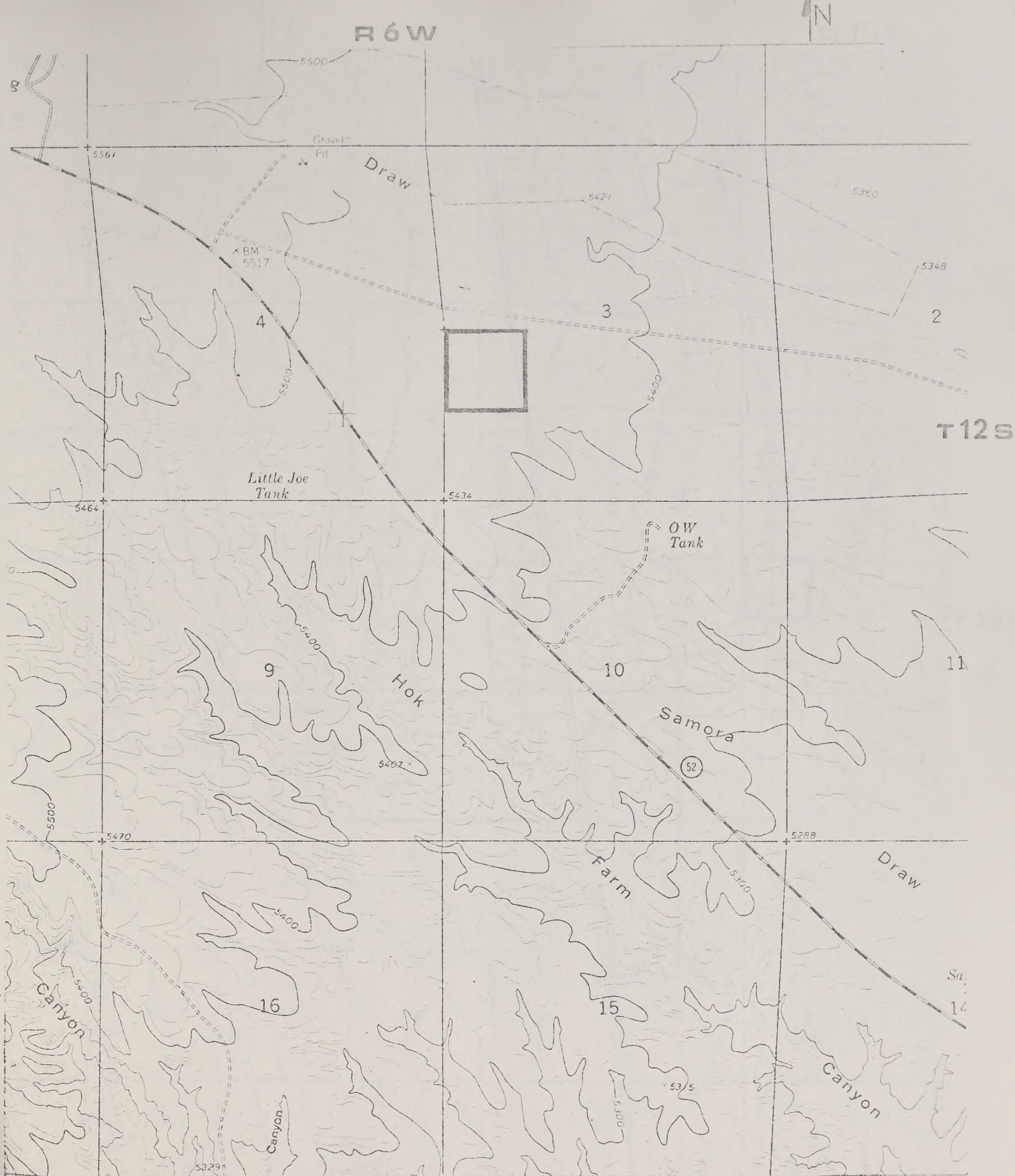

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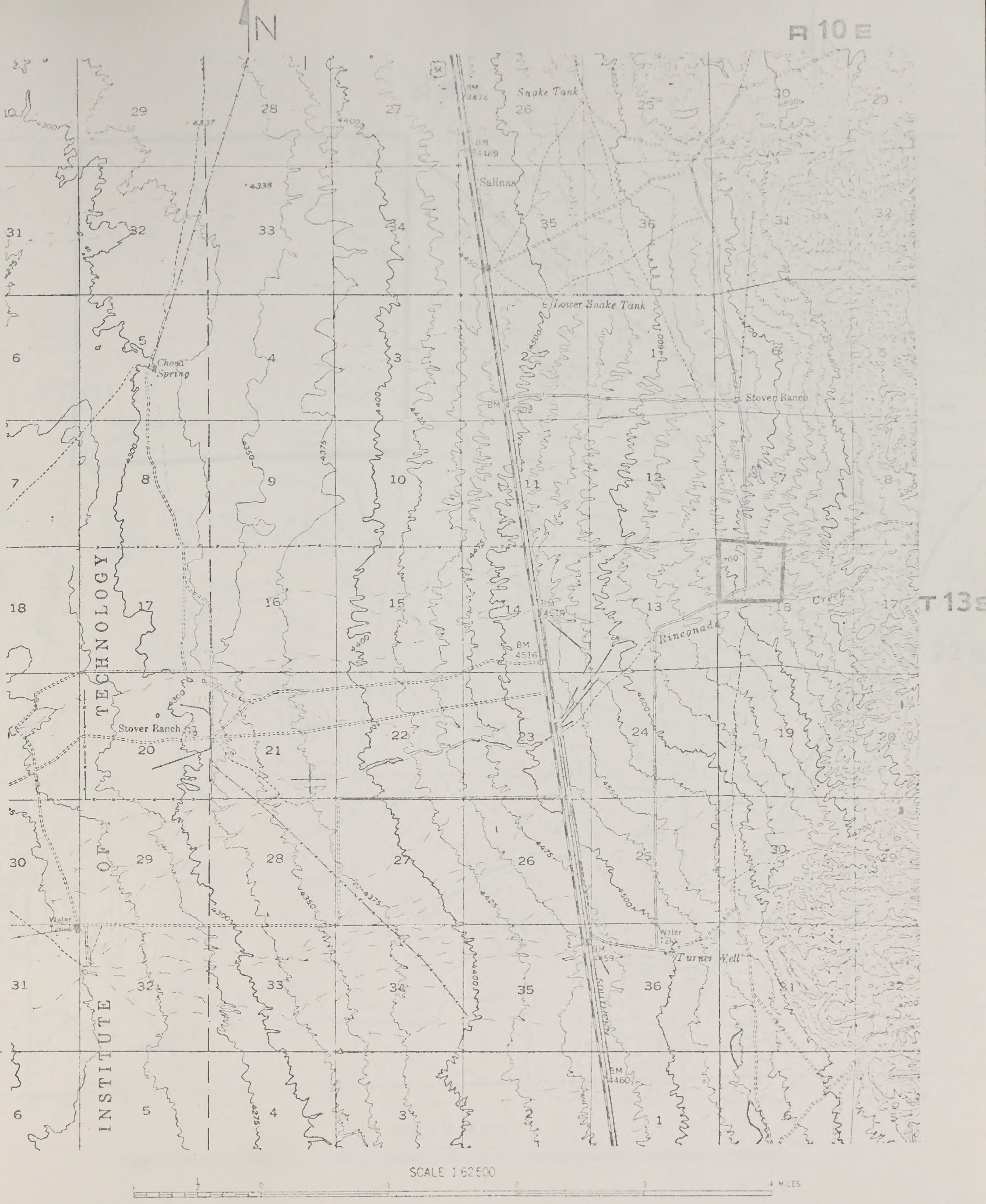

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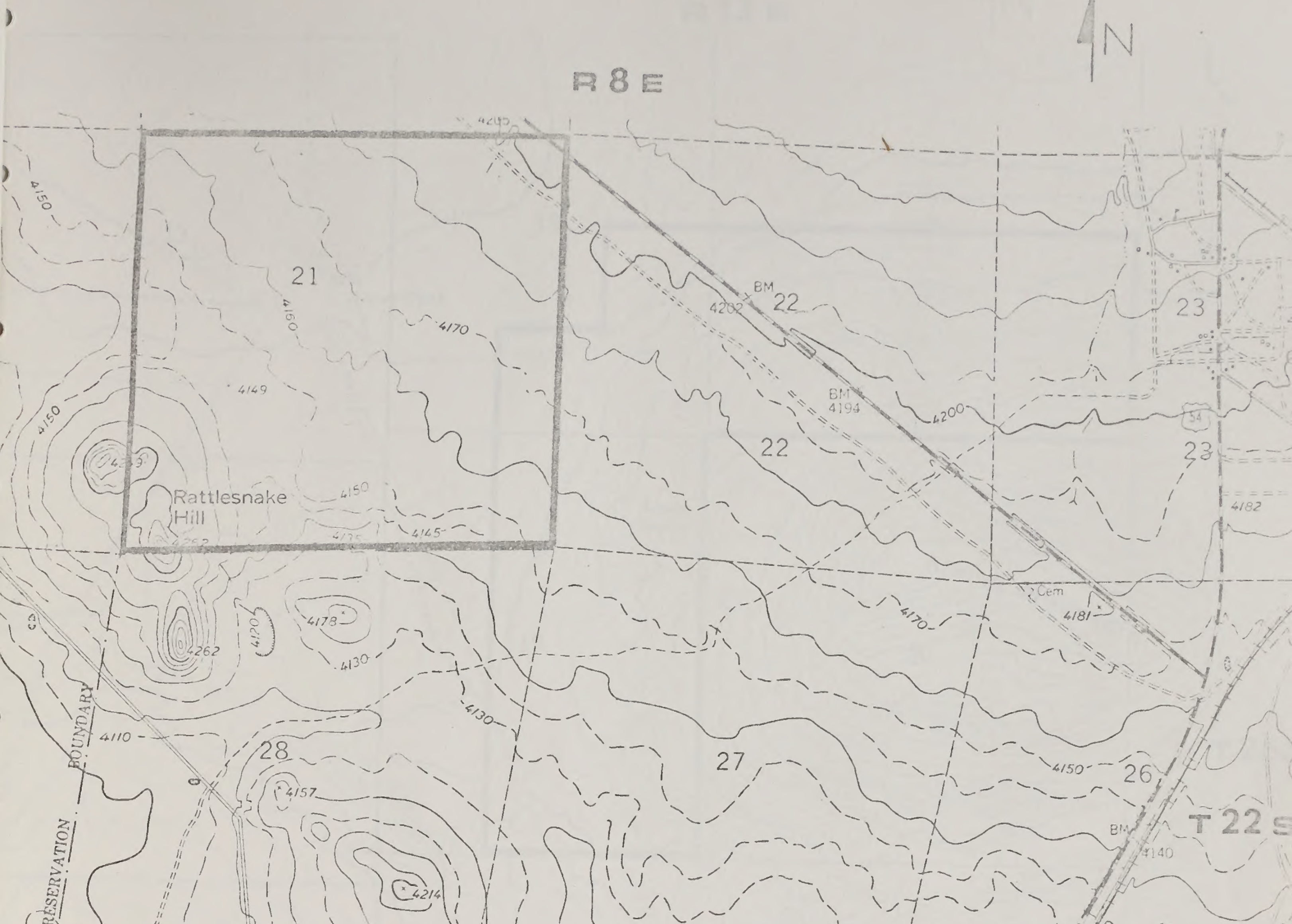

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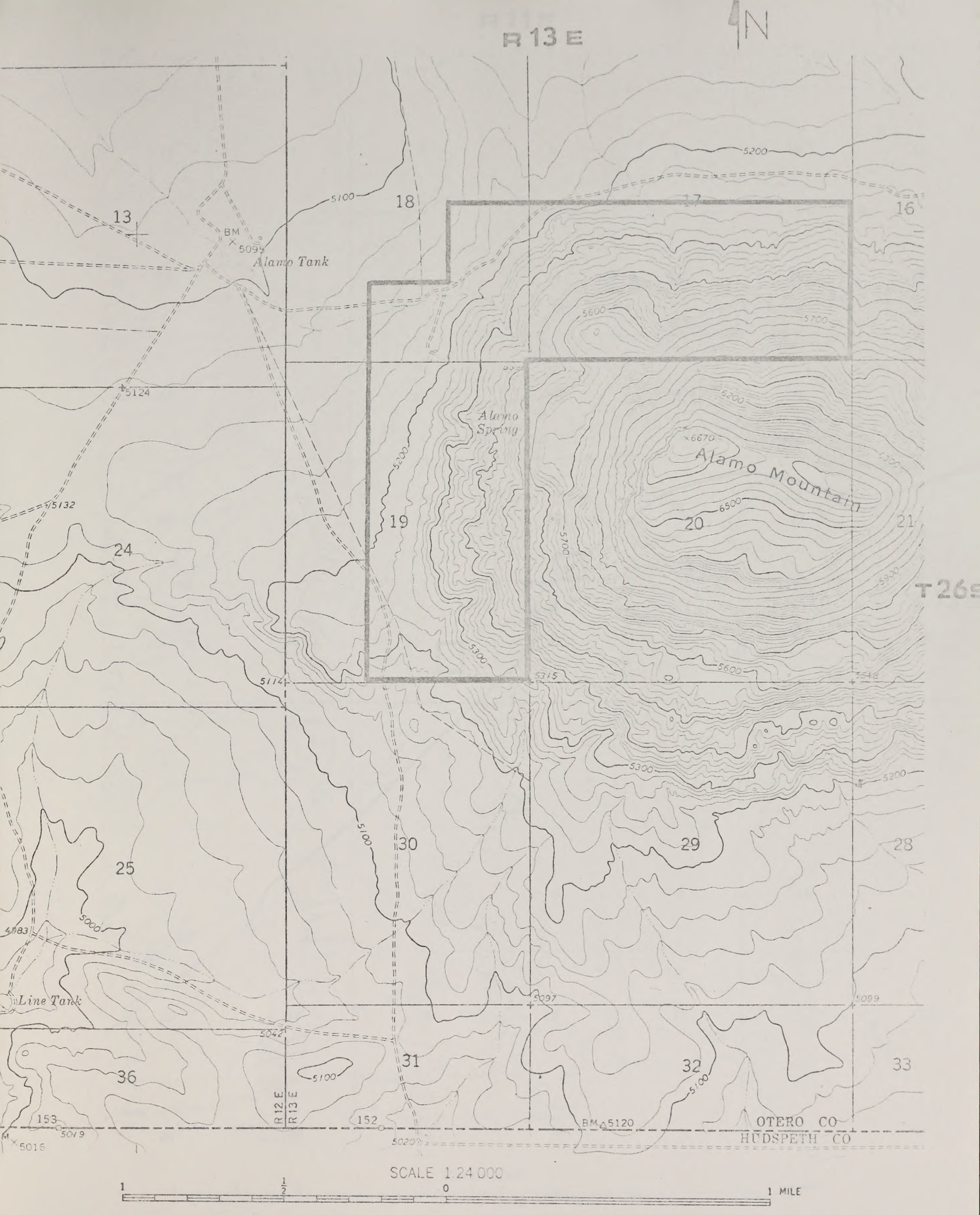

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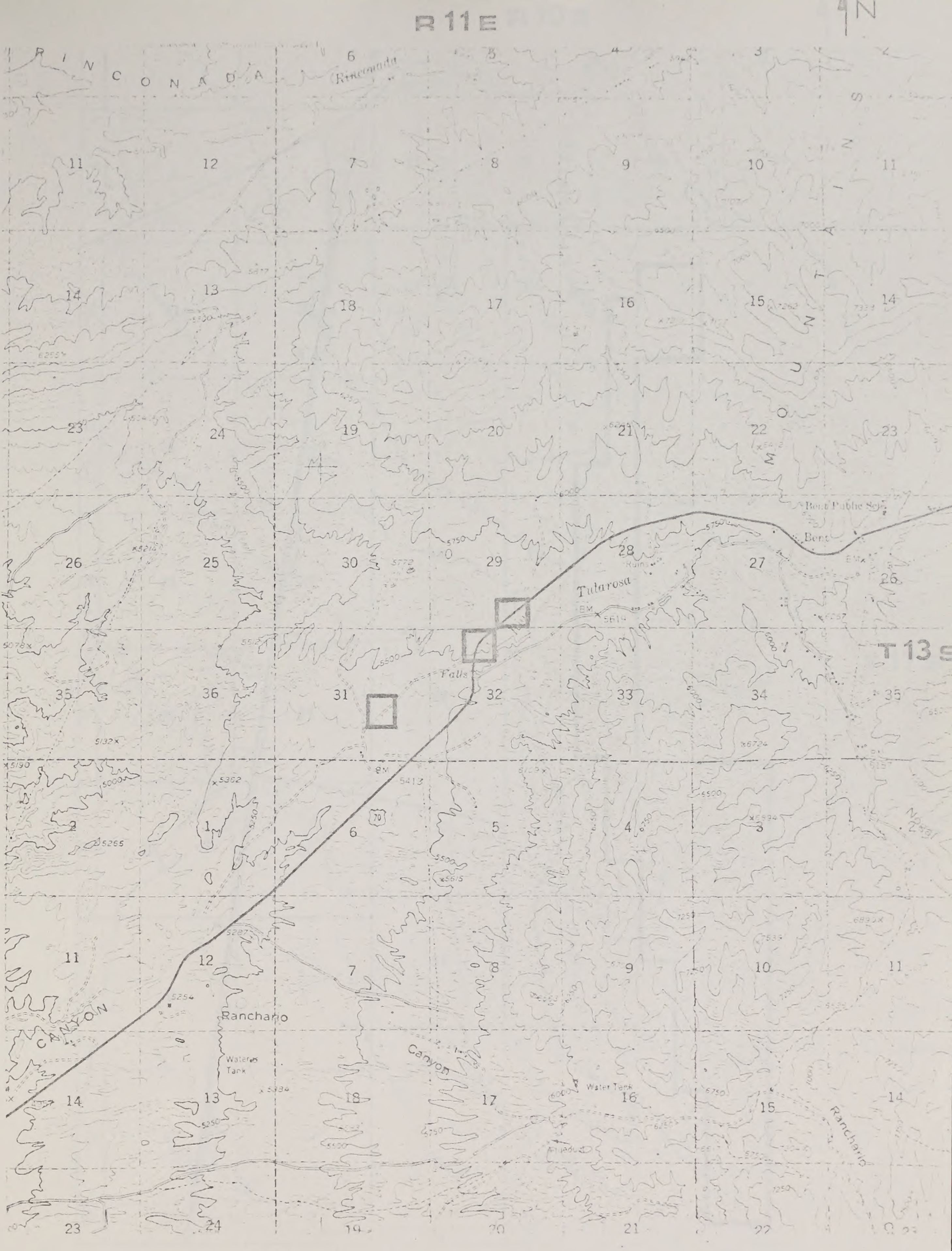
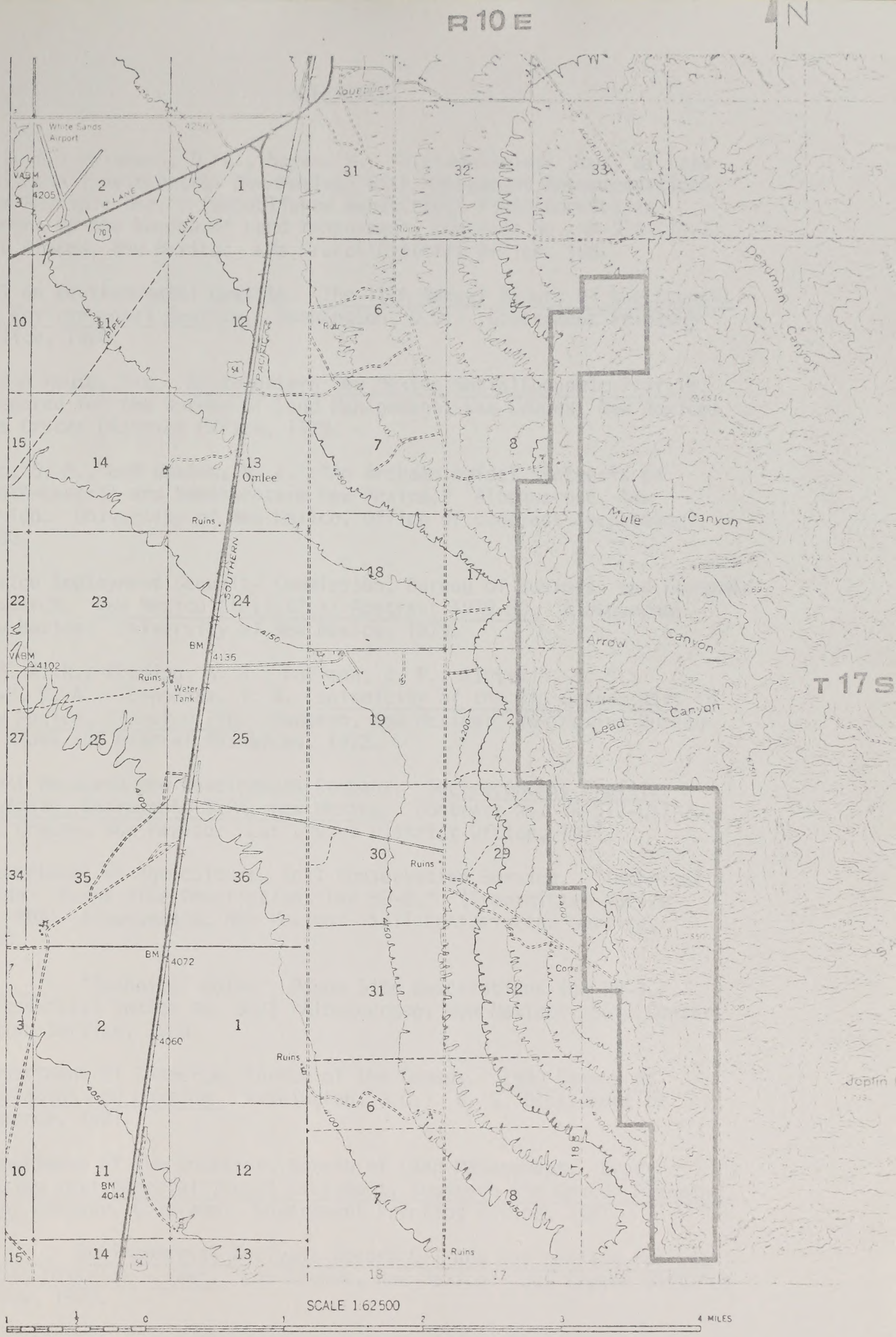


MITIGATING MEASURE 11



MITIGATING MEASURE 12

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